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Issues in Designing Consumer Information Environments

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Results of information processing research of particular importance for designing consumer information environments are reviewed and used in analyzing a proposal for provision of nutritional information by the Federal Trade Commission. An example of an alternative proposal is developed which is more congruent with human processing limitations.

Consumer research has shown a great deal of concern with public policy issues in the past few years (Wilkie and Gardner, 1974; Jacoby, Speller, and Kohn, 1974a, 1974b; Wilkie, 1974; Ross, 1974). One area of particular interest has been the design of information environments[1] for consumers (Jacoby, 1974; Wilkie, 1975), which provide the right information in the "right" manner so that consumers can make "better" decisions. The purpose of this paper is to discuss some major issues in this design process. The first major set of issues considered is the information processing demands which an information environment imposes on decision makers, relative to their processing capabilities and limitations. A second set, considered more briefly, concerns empirical evaluation of consumer information environments.

Because it is easier to discuss both sets of issues within the context of a particular example, we will consider the design of a system for presenting nutritional information in food advertising—the preliminary staff proposal of the Federal Trade Commission (FTC) for affirmative disclosure of nutrient information in food advertising (Federal Trade Commission, 1974). Although this proposal is clearly preliminary, is yet to be discussed in hearings, and could be varied substantially by the FTC, it is useful as a fairly concrete example of a consumer information environment. That is, the proposal, as outlined below, specifies the specific type of information to be presented to consumers, the amount of information to be disclosed, the mode of presentation, and so forth.

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[1] The term "information environment" denotes the entire array of product-related data available to the consumer. Some important characteristics of information environments are type of information available, amount of information available, modes of presentation, and modes of organization of information.

The next section briefly outlines this proposal. An overview of some research relevant to basic human information processing capabilities is then presented. The proposed system is evaluated using the research findings reviewed, and implications for the design of a system for provision of nutritional information are presented. Finally, the second set of issues on empirical evaluation of consumer information environments is discussed.

THE FEDERAL TRADE COMMISSION PROPOSAL

The FTC proposal is lengthy, so only a very brief summary of the most salient points is provided here. We will concentrate only upon the proposals for foods with nutrient labels. For more details concerning foods without nutrient labels see the proposed trade regulation rule and staff statement (Federal Trade Commission, 1974). The proposals outlined below are taken from the staff statement.

For television commercials for foods with nutrient labels, there are two cases: commercials whose length is 30 seconds or less and those whose length is greater than 30 seconds. For commercials less than 30 seconds in length, there are two main options. In the first option, the video portion of the commercial must present, for a minimum of six seconds, the names and percentage of the U.S. RDA (Recommended Dietary Allowance) for at least four of the following eight nutrients (protein, vitamin A, vitamin C, thiamine, riboflavin, niacin, calcium and iron) if they are present in a serving in an amount of 10 percent of the U.S. RDA or more. If there are less than four such nutrients, each must be presented. In addition, the number of calories per serving must be presented. If this option is taken and no nutrient is present in a serving at the 10 percent of U.S. RDA amount, a simultaneous audio and video statement of this fact must be made. The second option

is to disclose the nutrition information required to appear on the nutrient label on the package for that food for a minimum of 15 seconds. Finally, for either option the audio portion of the commercial must state "Read the food label for more nutrition information" (Federal Trade Commission, 1974, p. 39860). The proposals for commercials greater than 30 seconds in length follow the same pattern, with the time required for disclosure in the first option increased to 12 seconds. The other times and specifications are the same.

For print advertisements (with some exclusions), each nutrient and its percentage (including zero percent) of the U.S. RDA per serving as well as the calories per serving must be shown, or the nutrient information required on the food label must be shown. For radio advertisements, billboards, and some other display advertisements, the consumer is again directed to the food label.

RESEARCH ON HUMAN INFORMATION PROCESSING

The research cited below falls into three main categories: attention, memory functioning and parameters, and processing of alternatives. In each of these cases, only a brief sampling of research can be presented; a detailed review of each area is not attempted. Only that research thought to be most relevant to the FTC proposal is presented. In addition, controversy exists in many of these areas of research. Thus, the conclusions drawn are tentative. Finally, note that most of the studies cited assume an input-output model of information processing: that is, inputs are manipulated and resulting outputs measured. Wilkie (1975) discusses the advantages and disadvantages of the input-output and other paradigms for information processing research in detail. Research in the three major areas cited above is now briefly considered.

Attention

Attention as a cognitive phenomenon has become a central topic in experimental psychology within the last two decades. Attention has two major aspects: selectivity and intensity. Some stimuli are selected and singled out for processing, while others are ignored. Attention also refers to the intensity of the effort expended upon activities. Kahneman (1973) considers attention to be synonymous with a fixed capacity to perform mental work. He then considers issues relating to how this capacity is allocated in performing cognitive activities, particularly memory and processing. Norman (1969), in the context of models of memory, suggests that attention in memory tasks may be equated to rehearsal of material. Under both conceptions, therefore, memory functioning is intimately related to attention.

Kahneman (1973) discusses two major determinants of how attention is allocated: enduring dispositions and momentary intentions. Enduring dispositions refer to relatively involuntary rules of attention, and are perhaps best captured in Berlyne's (1960) notion of collative properties of stimuli: novelty, complexity, surprisingness. In general, attention is directed if there is a mismatch between stimuli and expectations.[2] Momentary intentions refer to voluntary and often goal directed factors: look for information about product X, listen for a particular commercial, and so on.

Memory Functioning and Parameters

Most current models of memory postulate a three part memory structure: a short-term sensory storage, where information enters through the sense organs and decays very rapidly; a short-term memory (STM), to which some subset of the sensory input is transferred; and a long-term memory (LTM) to which information is transferred from short-term memory (Greeno and Bjork, 1973). Transfer of material from short-term to long-term memory is thought to require rehearsal of the material in STM.

The famous paper by Miller (1956) first formulated the hypothesis of a limited size for STM. In specifying this limit, Miller also introduced the concept of a chunk of information, an organized and meaningful information structure. In effect a *chunk* is an organized cognitive structure that can grow as relevant information is integrated into it, a "configuration that is familiar to the subject and can be recognized by him" (Newell and Simon, 1972, pp. 780-1). The limit on the size of the STM store was found to be roughly seven chunks. The actual amount of material stored in STM could be increased by facilitating the formation of larger chunks. Simon (1974) summarizes research on relative size of chunks for prose, nonsense syllables, words, digits, and chess pieces. McLean and Gregg (1967) also studied preferred chunk sizes in a rote learning experiment, and found subjects used chunks of three to four letters.

Attention is important in memory processes because it affects the rehearsal needed to transfer material from short-term to long-term memory. In fact, the effective size of STM seems to be reduced from its normal capacity of seven chunks to no more than two or three if a task requiring additional attention is undertaken at the same time as rehearsal (Newell and Simon, 1972; Waugh and Norman, 1965). The importance of attention to memory is accommodated by Kahneman's (1973) notion of attention as capacity. Allocation of capacity away from rehearsal to another task will effec-

[2] Research of involuntary rules of attention has often found a nonmonotonic relationship between collative properties and attention. That is, attention may be maximized by moderately complex stimuli, for example, and may be low for stimuli which are very simple or very complex (Kahneman, 1973).

tively limit the number of items which can be rehearsed. If attention is devoted to processing a stimulus and it is rehearsed, research on memory speeds shows that from five to ten seconds are required to rehearse one chunk of information and fixate it in long-term memory (Newell and Simon, 1972, pp. 793-96; Simon, 1969, pp. 35-42; Bugelski, 1962). If material is not rehearsed in this way, it is lost from short-term memory and forgotten within roughly thirty seconds. The mechanism for loss from short-term memory is as yet unresolved; decay (Atkinson and Shiffrin, 1968) and displacement (Waugh and Norman, 1965) have both been supported.

One final set of findings relating to memory coding is relevant. A series of research studies examined whether encoding and memorization of properties of objects are easier if all the dimensional values of an object are presented (object coding), or if all the values for the set of objects under study on a particular dimension are presented at one time (dimension coding). Haber (1964) used a brief presentation (1/10 second) of cards portraying stimuli which varied along three dimensions. Some subjects were instructed to use an object coding method, while others were instructed to use dimension coding. Haber found that dimension coders were slower and less accurate in recalling unemphasized dimensions. Lappin (1967) used different stimuli, again with three dimensions, and did not instruct his subjects on coding schemes. Rather, he tested recall by objects and by dimensions. He found better recall for the three dimensions of each object than for the same dimension over three objects. Finally, Montague and Lappin (1966) found, in a replication of Haber's (1964) experiment, that object coding was faster than dimension coding. However, they did not find differences in accuracy, contrary to Haber's results.

Processing of Alternatives

A great deal of research has been directed to the study of how humans simplify the choice tasks facing them. Simon (1957) suggested that man is only "intendedly" rational, since his capacities are limited. He proposed that humans satisfice, or find an alternative that is good enough, rather than maximize. Since that time, several researchers have supported the notion that *choice* among alternatives is simplified if processing is organized by *attribute* or *dimension*.[3] That is, it is easier to *compare* alternatives on one attribute, then move to the next attribute, and so forth (this contrasts with the greater ease of *coding* and recall if processing is organized by alternative, as outlined above).

[3] The terminology in choice experiments varies greatly. In the psychological literature the terms object and dimension are often used, whereas in consumer research the terms brand and attribute are common. In this paper, for convenience the terms are used interchangeably, particularly dimension and attribute, although some researchers have argued that this is inappropriate (Wright, 1973).

Tversky (1969) developed an additive difference model of choice between two alternatives which postulates within-attribute processing. In this model, the alternatives are compared directly on each dimension. The contribution of this comparison for each dimension to an overall evaluation is then summed for all dimensions. Payne (1975) suggests how this model could be extended to the multi-alternative case. Tversky argues that intradimensional evaluations are easier than interdimensional ones, because the alternatives can be compared using the same units (since the same dimension is utilized). Tversky thus argues that evaluating each alternative one at a time and comparing these overall evaluations is more difficult than evaluating all alternatives on a dimension and eventually combining over dimensions, since processing by dimensions (attributes) requires only half as many interdimensional evaluations as processing by alternatives. Tversky (1969) also states that processing by dimensions can lead to dropping dimensions from the analysis if all alternatives are seen as equivalent for those dimensions. Finally, Tversky (1972) also proposed another model for processing by dimensions, the elimination by aspects model. In this model, dimensions are selected probabilistically (with probability of selection proportional to the weight attached to a dimension). Alternatives are examined for the selected dimension, and those without a satisfactory value on the dimension are eliminated. A new dimension is then selected and the process continues until a single alternative remains.

Some empirical work has examined whether subjects process by alternative or by dimension. Russo and Dosher (1975) report research in which subjects were asked to choose between two alternatives, each having three attributes. Subjects were found to process by attribute, first comparing alternatives within attributes and then combining over attributes. The study also showed that subjects had a difficult time using more than two dimensions. With two attributes, subjects need only evaluate the relative differences on the two attributes. For three or more, the tradeoffs become much more difficult. However, careful studies on individual differences are needed here to ascertain more precisely the numbers of attributes which can be handled. Some individuals may be able to handle complex displays with many attributes.

Russo and Rosen (1975) examined choices among six used cars, each having three attributes. The alternatives were presented as verbal descriptions on a cathode ray tube, and subjects' sequences of eye movements were examined. The findings showed that subjects used paired comparisons to evaluate brands, thus breaking the task down to a pair-wise choice task. Their findings did not support the elimination procedure hypothesized in Tversky's (1972) elimination by aspects model.

Payne (1976) and Bettman and Jacoby (1975) examined directly how subjects acquire information. Both

studies used a task where a brand X attribute display board was presented, with information available on cards for each brand-attribute combination. Subjects selected cards until they wished to make a choice, and the sequence of cards selected was analyzed. Payne (1976), using apartments as alternatives, found individual differences in processing, with roughly two-thirds of his cases processing by attribute. Bettman and Jacoby (1975) used breakfast cereals as alternatives. Of a usable sample of 47, 22 used processing by attributes; 18, processing by brands, and 7, a hybrid strategy. Thus there is evidence that a majority of subjects prefer to process by attributes. In summary, both on theoretical and empirical grounds, it can be argued that facilitation of processing by attributes can help to simplify choice processes. Note that the above analyses all refer to choice among alternatives. This may not be the only aspect of processing relevant to the FTC proposal, however. For example, an accept-reject evaluation of a particular product (perhaps demanded by one's children) might be desired. More is said about this below.

AN INFORMATION PROCESSING ANALYSIS OF THE PROPOSAL

The analysis below for simplicity will be confined mainly to the case of a 30 second television commercial. The issues considered remain relevant for the other television commercial cases, although some details may change (For a related discussion, see Jacoby, 1974).[4]

The point of view of this author is that it is *crucial* for consumers to have access to nutritional information. The issue is *not* one of whether or not nutritional information should be presented. It *can* and *should be* presented. The issue is rather one of how to present the information most effectively so that consumers can process and use it, if they so desire. Thus, the remarks below about the specific FTC proposal *do not imply* that nutritional information should not be provided. They simply question the proposed mechanisms.

The information environment design embodied in the proposal implies that a consumer attends to the commercial, processes and remembers the information presented, and retrieves it later for use in the purchase situation. Repetitions and over-time effects of the commercial would presumably increase the consumer's ability to remember and use the information. There are other possible effects of the proposal than the learning of nutrient information. For example, there may be motivational effects, in that consumers may be more motivated to look for and use nutrient information in the store. Consumers might also examine nutrient information on products in their cupboards after seeing a commercial. That is, a proposal whose main purpose is to guarantee availability of information may serve to stimulate awareness as well. Some of these possibilities are discussed below. The important point is that any system may have many possible effects, some of which it may attain while failing to obtain others. For now the main focus is on the three major loci of demands for cognitive effort on the part of the consumer attempting to learn nutrient information: attention, memory, and evaluative processing.

As noted above, the consumer must attend to the commercial to take in the nutritional information and to store in memory the presented material. Under the present proposal, it is possible for the nutrient information to be displayed with no simultaneous related audio portion (unless there are no nutrients present at 10 percent of the U.S. RDA). This may not be sufficient to engage the consumer's attention: an audio portion may be necessary. An audio emphasis on nutritional information might be initially incongruous, given current food advertising, and attract attention. Research on modality (audio, video) effects in memory should be useful here (Penney, 1975). Otherwise, a preliminary appeal to nutritional needs and the importance of the ensuing nutrient information might be necessary to direct momentary intentions. The proposal as stated assumes consumers will attend (a variant of the pervasive rational man assumption); cognitive psychology holds that man has limited capacity and allocates it carefully. Attention (or allocation of capacity) must therefore be developed.

This analysis of attention has been presented strictly from the point of view of a program where there are no external forces leading to increased consumer attention. This may be too restricted a view. There would undoubtedly be a great deal of television and newspaper publicity surrounding any nutrient information program which would increase attention and interest. Also, there presumably already exist segments which have a high degree of interest in nutritional information. Finally, over time some consumers may become more attentive to the information presented even if they do not attend to the first few commercials to which they are exposed. Thus, individual differences become an important aspect to be considered. For some consumers, attention may already exist; it may not always have to be developed. The relative size of this already attentive segment, an empirical research question, then becomes important in formulating designs for information provision. The larger this segment, the less the need to be concerned about strategies to develop attention.

[4] For print advertisements, the task is easier on consumers, since length of exposure can be controlled, so the full amount of information might conceivably be assimilated. Alternately, the centralized in-store display or some portion of it could be presented in the ad. Although the print advertisement could provide a much better display from an information processing standpoint, it still seems worthwhile to limit the ad to a role of directing consumers to the in-store display. If the information is presented in the advertisement, then attention and memory are still involved, which could be inefficient. However, the information processing constraints on print advertisements are far less than those on television commercials.

The proposal makes severe demands upon consumer's memory mechanisms. Under the first option, nutrient information is available for six seconds for possibly five to nine pieces of information (at least four nutrients plus calories). Under the second option, as many as nine pieces of information would be shown for 15 seconds. The research on speeds of transfer from short-term to long-term memory reported above shows that such a presentation would probably overtax memory. That is, the time available would allow memorization of only one or two chunks at best, recalling that the five to ten second times for fixation of one chunk are derived from verbal learning studies, with subjects motivated to perform well and paying careful attention. In addition, the distractions inherent if only the video portion were nutrient information could easily cause reductions in short-term memory capacity. As noted in the review above, anything which takes attention away from rehearsal effectively reduces short-term memory capacity. The assumption of full attention to the commercial seems unlikely. Thus, it seems highly improbable that the consumer can take in and remember the information presented, because of limitations in processing ability. This does not include any possible negative effects of information overload on comprehension of the information (Jacoby, Speller, and Kohn, 1974a, 1974b; Wilkie, 1974; Russo, 1974).

The analysis above makes the presentation of nutrient information seem a formidable task indeed. However, there may be mitigating factors which must also be considered. Given that a chunk is an organized cognitive structure, there will be some range of individual differences in the initial content of these structures. Some consumers may have quite complex structures, into which nutrient information could be assimilated fairly readily. Repeated exposure might also facilitate learning. The point is that there are several issues involved, including individual differences and over-time effects, which are researchable.

The FTC is concerned not only with brand information but also that consumers be able to evaluate entire product classes relative to their personal nutritional standards. In fact, these product-product choices may be more important than brand selection. If consumers have learned acceptable level thresholds for various nutrients, it is possible that they could evaluate product classes under the FTC proposal. If so, then a satisfactory-not satisfactory judgment for a product class might be possible under the FTC proposal since commercials are seen for several brands within a class. However, this depends upon the existence of learned thresholds or acceptable level cutoff points, which consumers may or may not possess. The number of consumers who possess such thresholds could be determined through empirical research. If consumers wished to find products which meet a certain standard, at least 50 percent of the U.S. RDA for vitamin C, for example, then the nutrient information in a commercial could be fairly easily processed to "flag" products meeting this standard. Thus, the whole question of the goals motivating consumers' information processing is a crucial question for empirical research, as individual differences with respect to such goals would affect the evaluation criteria used for proposals for information provision.

The analysis just presented is for a single presentation. However, commercials can be repeated over time. Repetition of the commercials might increase the amount remembered. The significant question would be how repetition affects formation of chunks. The consideration of information processing issues can thus provide an important theoretical guide for what experimenters need to be performed and which questions need to be answered.

One might argue that the consumer need not remember the information presented, that most of it is, after all, available in the store on the package labels. The commercial can serve to make the consumer aware of nutrient information and lead him or her to examine it in the store. Storage of nutrient information and retrieval in the store are not required. This may be true; however, as discussed below, if all the commercial does is get the consumers to read labels in the store, then the information presented is not really used and a simpler disclosure could be used in the commercial, with the actual information presented in the store.

Ability of consumers to process the information presented in making brand comparisons is also important. The typical presentation of nutritional information under the proposed system, however ingenious it might be, would be by *brand*. Unfortunately, as argued above, it is cognitively easier for humans to make brand comparisons by *attribute*: that is, it is easier to compare the brands under consideration on one attribute, then move on to the next attribute, and so on (Russo, 1975; Tversky, 1969, 1972; Payne, 1976; Bettman and Jacoby, 1975). To reiterate, the basic argument is that evaluating one brand at a time over all attributes forces consumers to make tradeoffs among all attributes for all alternatives. Processing all brands an attribute at a time reduces this load, as alternatives may be dropped, or attributes not considered if no significant differences are seen among the brands. Processing by attributes directly provides comparative and relative information, and gives a context for judgment. Seeing figures for each brand in isolation means that memory must be utilized to provide the relative information. The context must be created from memory rather than being readily available. Note that this also argues for presenting several attributes at once rather than one attribute at a time. Again, one might argue that comparisons are made in the store, not in one's head. If that is true, presenting the information in the commercial seems at best inefficient. It may also lead to a more focused search in the store, as a consumer would usually compare only a

relatively small number of brands based upon his evaluation of them in memory. This limitation on processing effort is usually a necessary device; methods for expanding the range of alternatives which can be processed are discussed below.

Hidden in the above arguments is a conflict in processing systems. Memory coding, as discussed earlier, is easier if information is presented by brand (Haber, 1964; Lappin, 1967; Montague and Lappin, 1966). However, making brand comparisons is facilitated by presenting information by attribute. This incompatibility within the human information processing system has implications for the design of consumer information environments which we will now discuss.

IMPLICATIONS FOR DESIGN OF CONSUMER INFORMATION ENVIRONMENTS

The above analysis outlines properties of human information processing which imply that the proposed nutritional information program may present obstacles to learning of nutrient information by consumers. Obstacles could perhaps be eased by modifying aspects of the proposal. For example, a format might be developed which provided coded information on nutrients for a brand relative to *other brands* in that class, as well as relative to U.S. RDA requirements. The information relative to other brands would facilitate processing by attributes and brand comparisons. Information relative to the U. S. RDA is also necessary, because the FTC is concerned with the consumer's ability to evaluate a *product class* relative to reasonable nutritional standards, not only with ability to compare brands within a product class. Also, ingenious ways might be found to help consumers organize the nutrient information presented into larger chunks in memory. However, other system designs which more directly attack the issues raised might be more effective. A brief example of such a design is presented below; the issues raised by such a design are then discussed. The alternative design is not intended to be a specific proposal; rather, it is an example of a class of designs which would attempt to facilitate consumer processing. In this alternative design, the commercials *would not attempt* actually to present the nutritional information, due to the probability that consumers simply could not handle the input. Instead, the commercial would emphasize the benefits of nutritional information and direct consumers to an in-store display of this information. Thus, the commercial would direct consumers to a specific mechanism for examining nutrient information.

The core of the approach is the nature of the in-store display. The basic idea for the display was first outlined by Russo, Krieser, and Miyashita (1975) and expanded by Russo (1975). The display would be mounted on the store shelf and would present, for an *entire product class,* a listing of all brands and sizes with summary nutrient information for each brand. See Russo, Krieser, and Miyashita (1975) for an example using unit price, and Russo (1975) for an example using unit price and quality ratings. Two or three summary attributes would need to be used (if possible to develop) because of the limitations in consumers' ability to combine many attributes into an overall rating documented above (Russo and Rosen, 1975). Russo, Krieser, and Miyashita (1975) have documented that this system works effectively for unit pricing: in their actual in-store study, consumers saved about 2 percent, on average. It is important to understand *why* this system works so that the principles can be applied to other systems. The system appears to work because it handles most of the information processing constraints raised above. First, the system removes the memory demands from the limited time exposure commercial. The commercial provides only one simple directive input. Second, the system partially *decouples* the memory system from the processing system, hence removing a good deal of the memory-processing incongruity discussed above. Since the list is available in the store, there is no need to store a lot in memory. Third, the centralized display, perhaps arranged with columns for each attribute, greatly facilitates processing by attribute.[5] Fourth, by building summary attributes the consumer is aided in chunking the information for processing. Fifth, the centralized list perhaps makes more brands available for processing, since search may not be guided by evaluations in memory to as great an extent. Also, processing is facilitated by the list, so that more alternatives can be examined without undue effort. Finally, such a list would also facilitate making evaluations of an entire product class relative to other product classes, by making it very clear how well all the brands in that class meet nutritional standards. Evaluation of a product class from such a list would be much easier than attempting to examine each brand individually so that a conclusion about the product class could be drawn.

The FTC proposal as it stands could certainly be added into such a system. The in-store list could be provided without changing the FTC proposal relative to the commercial. However, then presentation of the nutrient information in the commercial seems inefficient, and could cause an overload of information, which might hamper the function of directing the consumer to the in-store display.

This example, of course, raises many issues of costs and of implementation. Would store traffic patterns be disrupted by consumers attempting to read the lists?

[5] Processing by attribute can be done with the typical store display, certainly. However, the process of looking from one package to another becomes tedious, particularly for more than two alternatives. A standard revision strategy of comparing two alternatives at a time and retaining the best for the next comparison could also be used (Russo and Rosen, 1975), but this also seems like it would entail a great deal of effort.

Would stores be responsible for developing the list, perhaps with an allowance from manufacturers for doing so? Would this hurt small grocery retailers, since costs of developing such lists would be higher for them, given less automated operations? How would local brands be handled? Could "summary" attributes ever be developed, given different consumer preferences and the substantial technological and nutritional problems involved? How would changes in brand formulations be handled? Would such a system work as effectively for product-product comparisons as for brand-brand comparisons?

The questions above emphasize the complex array of issues raised by the alternative design proposed. However, it is important to emphasize at this point that it is *not* the purpose of this paper to give a definitive design. The important point is not the details of the specific proposal, but the *system* of considering information processing issues and attempting to develop designs which are congruent with those issues. Thus, the purpose of the example is to point out one alternative direction a design might take, given human processing limitations. Other alternatives should clearly be considered. Any specific system proposal should carefully consider the costs and benefits involved, particularly relative to the costs and benefits of other proposals. It is clear from the questions raised above that serious issues of practicality would have to be resolved in developing a detailed design along the lines of the example presented. The point of this paper is that alternatives should be considered and processing issues must be important criteria in evaluating designs. Some tradeoff between logistics and consumer information processing concerns is needed. Russo, Krieser, and Miyashita (1975) and Russo (1975) also briefly discuss some of the issues. Again, these issues are not easy, but the task is very important.

The example outlined above presents some alternative directions for provision of information to consumers. As noted, implementation of such alternative directions in a detailed system raises many issues, some of which would need to be resolved empirically. Thus, research would presumably be undertaken before any such design would be adopted or implemented. Some major issues that arise in research intended to evaluate consumer information environments are briefly discussed below. Again, for the sake of clarity, the context is the nutritional information example used thus far.

EMPIRICAL EVALUATION OF CONSUMER INFORMATION ENVIRONMENTS

The two problems which are most significant in empirical evaluation of consumer information environments, and in fact upon the design of the information environments themselves, are choice of appropriate criterion variables and issues of sampling. Because these issues are pervasive, they must be discussed here. Other issues more strictly related to design of experiments are discussed well in other sources (Campbell and Stanley, 1963), and so are not mentioned here.

Attempting to evaluate empirically the effects of a particular proposal for a consumer information environment immediately raises the difficult problem of an appropriate criterion for evaluation. The basic issue is whether the intent of an information environment is "processing" or "policy" normative.[6] A system is said to be "processing" normative if it is intended only that consumers should be aided in perceiving and processing the appropriate information, but there is no commitment to how or even if consumers use such information. Usage is a subjective individual consumer decision, and the system does not try to direct that decision other than by providing information in a fashion facilitating processing. A system is "policy" normative if the intent, based upon some notions of rational behavior, is that information be used in a particular manner, if there is a policy or goal of "educating" the consumer to make "better" purchase decisions. The policy maker desires a specific outcome or set of outcomes in the "policy" normative case; in the "processing" normative system the policy maker desires only that information can be handled relatively easily. Outcomes are left to consumer preferences. Consumer research as a discipline has not yet effectively dealt with such normative issues. The basic question is the extent of consumer sovereignty, whether consumers should ultimately decide or whether policies should attempt to direct consumers in specific ways.

The appropriate criteria for evaluating system effectiveness differ greatly, depending upon the normative intent. For a "processing" normative system of nutritional information provision, for example, an appropriate criterion measure seems to be simply how readily the consumer can determine which products are more nutritious. Whether or not the consumer chooses the more nutritious products is of no concern in a processing normative system, so recall and knowledge become important criteria.[7]

For a "policy" normative system, it is necessary that consumers be persuaded that the information presented is important for making choices and should be used. Criteria would then be, for a nutritional program, whether consumers felt an increased need to incorporate

[6] This distinction is a difficult one; both orientations could be seen as types of policy. Perhaps a continuum, rather than a dichotomy, is appropriate.

[7] Jacoby, Speller, and Kohn (1974a, b) attempted to devise a more complex measure of subjective satisfaction based on ideas from multiple attribute attitude models. However, this approach probably raised more questions than it answered (Wilkie, 1974; Russo, 1974). The arguments above imply that the complexity of this criterion is unnecessary in a truly "processing" normative system, and it does not capture the essence of a "policy" normative approach.

nutritional information into their decisions, whether nutritional foods were in fact purchased more under such a system, and so on. Attitudes and behavior become much more important, rather than the relatively cognitive measures (such as awareness, recall, and knowledge) for a "processing" normative system.

Since proposals for information provision often involve adversary proceedings, "policy" normative stances are often taken. It is not clear what the resultant goals for a system might become after such proceedings. The point is that the goals should be made clear and appropriate criteria defined. Since adversary proceedings may lead to systems with a "policy" normative flavor, consumer researchers should devote more thought to appropriate standards for what constitutes normative behavior and to appropriate criteria for defining a "policy" normative system. In addition, testing a "policy" system accentuates some traditional experimental concerns. Demand characteristics and experimental artifacts (Sawyer, 1975) are much more likely to arise in researching "policy" normative systems. For example, measures of the importance of nutrition to the consumer are undoubtedly highly upward biased, as would usage probably be in an experiment where the focus was obviously on nutritional inputs. Since current commercials do not present much nutritional information, such a focus would be hard to avoid. In sum, the very criteria used depend heavily upon the intent of the system, and the intent seems to be an important policy issue. Jacoby (1974) also discusses the great need for development of appropriate dependent variables and criteria.

A second crucial issue in evaluating information environments is sampling. For controversial proposals, where court action is likely, samples should be representative of the total population. Legal and research orientations may conflict over what constitutes an acceptable sample. However, in addition, there is an obligation to study special populations as well, particularly if the system is to be "policy" normative. For nutritional information, this would entail ensuring that adequate samples of those groups suffering to the greatest extent from poor nutrition are included: the poor, the elderly, families with many children, and so forth. This will make sampling more difficult, but the groups especially at risk must be examined carefully. The specific locus of the system's influence must be considered, as well as its total extent. A system might be evaluated poorly if none of the groups at special risk were affected, even if other groups were.

A second important issue in sampling concerns protection of respondents' anonymity and the related problem of whether surveys will be allowed as evidence if respondents' names are not provided upon request so that the respondents may be cross-examined. It is not clear how this legal issue will be resolved; however, it could affect surveys for any proposed design.

The information processing and evaluation issues above are presented as examples of concerns which need to be addressed in designing and judging proposals for consumer information environments. The purpose has been to raise as many issues as possible, and to urge that these issues be considered in the design process. It has become clear in the course of this effort that special attention must be paid to the broad issues of multiple system goals, individual differences in consumers, and over time effects, as well as to the specific information processing and evaluation concerns considered. It is hoped that exposure of these issues will stimulate research and thinking needed for resolution of the important policy and implementation questions that will arise.

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