Journal of Consumer Research, Inc.

The Effects of Stimulus and Consumer Characteristics on the Utilization of Nutrition Information

Author(s): Christine Moorman

Source: *Journal of Consumer Research*, Vol. 17, No. 3 (Dec., 1990), pp. 362-374

Published by: [The University of Chicago Press](#)

Stable URL: <http://www.jstor.org/stable/2626801>

Accessed: 23/09/2013 16:20

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

The University of Chicago Press and *Journal of Consumer Research, Inc.* are collaborating with JSTOR to digitize, preserve and extend access to *Journal of Consumer Research*.

<http://www.jstor.org>

The Effects of Stimulus and Consumer Characteristics on the Utilization of Nutrition Information

CHRISTINE MOORMAN*

This research investigates the effects of consumer characteristics (e.g., familiarity and enduring motivation) and stimulus characteristics (e.g., information format and content) on the utilization of nutrition information. Results indicate that both types of characteristics influence information processing and decision quality. Moreover, stimulus characteristics, in general, were found to facilitate these activities irrespective of consumer differences.

National nutrition policy . . . should insure that adequate opportunity for good nutrition and adequate knowledge about how to use available foods effectively for individual and family health is available easily and continually at the community level to people in all walks of life. [WHITE HOUSE CONFERENCE ON FOOD, NUTRITION, AND HEALTH 1970, p. 162]

Despite widespread support for adequate nutrition information and its use, 20 years of research indicates that this goal has not been achieved. Research suggests that consumers do not utilize nutrition information at the point of sale (Daly 1976; Jacoby, Chestnut, and Silberman 1977; Russo et al. 1986; cf. Levy et al. 1985) and that consumers benefit from nutrition disclosures to varying degrees, depending on characteristics of the consumer (Brucks, Mitchell, and Staelin 1984; Federal Trade Commission 1979) and of the information stimulus (Muller 1985; Russo et al. 1986).

Although previous research is an aid in understanding the use of nutrition information, the role of both consumer and stimulus characteristics has not been studied systematically. Despite this deficiency, both public policy and marketing strategy decisions involving nutrition information continue to be made. The present research addresses existing gaps in knowledge by investigating the effects of two stimulus character-

istics and a variety of consumer characteristics on nutrition information utilization. Specifically, this article presents results from an experiment designed to understand the effects of both types of characteristics on information processing and behavioral outcomes. In addition, theoretical and managerial implications are discussed, and future research needs are identified.

THE NUTRITION INFORMATION UTILIZATION PROCESS

Figure 1 depicts stimulus and consumer characteristics as two key antecedents of motivation and ability to process a message containing nutrition information.¹ Research concerning stimulus characteristics, which include information content and format, suggests that consumers utilize more nutrition information when it is presented in an easily processed form (Levy et al. 1985; Muller 1985; Russo et al. 1986; Scammon 1977). Consumer characteristics include such individual differences as enduring interest in health and nutrition information, nutritional knowledge, and such demographic factors as education and age. Existing research indicates that consumers with prior nutritional knowledge utilize more nutrition information than those with no prior knowledge (Brucks et al. 1984; Jacoby et al. 1977).

Figure 1 shows that the antecedent conditions of consumer and stimulus characteristics encourage or discourage motivation and ability to process. Motivation to process is an internal readiness to process

*Christine Moorman is an assistant professor of marketing at the University of Wisconsin Graduate School of Business, Madison, WI 53706. The author acknowledges the support of Larry Feick, Dick Moreland, John Murry, C. W. Park, and Gerald Zaltman in completing this research. The insights provided by two anonymous reviewers are also appreciated.

¹Other recent frameworks of processing antecedents include consumer, situational, and stimulus characteristics (MacInnis and Jaworski 1990) and consumer and situational (which includes stimulus characteristics) characteristics (Celsi and Olson 1988).

FIGURE 1
THE NUTRITION INFORMATION UTILIZATION PROCESS

information, created by the personal relevance of the stimulus, while ability to process is the capacity to transform perceptual stimuli into meaningful information. Motivation to process facilitates greater information acquisition and elaboration. Ability to process facilitates information comprehension and elaboration (Greenwald and Leavitt 1984; Petty and Cacioppo 1986). Finally, comprehension and elaboration improve decision quality (Keller and Staelin 1987; Petty and Cacioppo 1986; Sproules, Geistfeld, and Badenhop 1978, 1980). The present research does not test this model explicitly. However, the model is implicit in the theory linking stimulus and consumer characteristics to different stages of the utilization process.

THEORY AND HYPOTHESES

The Effects of Stimulus Characteristics

Consequence Information. The first stimulus characteristic, consequence information, communicates the relationship between product-level or brand-level attributes (i.e., nutritional attributes, for the purpose of this research) and consumer consequences. Consequences are defined as any result accruing to the consumer from his or her behavior (Gutman 1982). The nature of the relation between attributes and consequences determines the personal relevance of consequence information and consumers' willingness to process it (Petty and Cacioppo 1986). Because research indicates that consumers find the consequences associated with negatively perceived nutrients (e.g., sugar, sodium, and fat) more relevant than those associated

with nutrients judged more positively (e.g., vitamins and minerals; see Heimbach and Stokes 1982; Russo et al. 1986), consequence information communicating negatively evaluated nutrients will be the focus of this research.²

Research suggests that information communicating negative consequences is utilized more effectively when it creates two interacting states. First, the message should arouse or emotionally activate consumers (Ray and Wilkie 1970; Sternthal and Craig 1974). Second, consumers should be provided with a way to minimize the hazards communicated to them (Leventhal 1970). For example, Evans et al. (1970) found that individuals receiving highly arousing messages (a description and portrayal of the hazards of poor dental hygiene) and elaborated recommendations (they were told when and how to behave) experienced the greatest change in dental hygiene behavior.

Given this logic, nutrition disclosures containing negative consequence information that is arousing and that offers remedies for overcoming this arousal should increase consumers' need for information about the relevant attribute, its negative consequences, and ways to avoid their occurrence (Burnkrant and Sawyer 1983). This increased need for information reflects

²The distinction between positive and negative nutrients contains some ambiguity. As Russo et al. (1986) note, many negative nutrients, such as sodium, are essential to good health. However, the necessary sodium level is very small for the majority of consumers and, therefore, its consumption should be moderated. There are small groups of people who need to consume more rather than less of these negative nutrients (e.g., those who work outside in hot climates). In general, however, the positive-negative distinction applies to the majority of consumers (Russo et al. 1986, p. 49).

consumers' motivation to process the message. Information about negative consequences should also increase consumers' levels of information acquisition and elaboration. Finally, negative consequence information should enhance the quality of decision making when the message activates and instructs consumers to carry out specific behaviors. Hence,

H1: Nutrition disclosures containing highly arousing negative consequences and specific guidance on ways to minimize these consequences result in higher motivation to process, higher information acquisition, higher information elaboration, and higher decision quality than do disclosures that are less arousing and specific in guidance.

Consequence and Reference Information. Consumers need a frame of reference to encode nutrition information. The referent used in encoding new information may come from consumers' existing knowledge about a given product attribute. Alternatively, the referent may be stated explicitly in the information to be encoded. In the past, researchers have concentrated on the former and investigated consumer characteristics that facilitate encoding, suggesting that existing knowledge enhances information processing by providing readily accessible referents. This focus on consumer characteristics may have caused researchers to overlook the value of creating a frame of reference by embedding a referent in the message itself. The present research adopts this latter approach and builds a frame of reference for nutrition information by manipulating a second stimulus characteristic, that of reference information.

Explicitly providing reference information within the context of a message has two important advantages. First, it provides a frame of reference that is independent of consumers' knowledge levels and thus enables more consumers to process the message. For example, nutrient information presented as a percentage of a recommended daily allowance (RDA) is less dependent on consumers' knowledge levels for interpretation than is nutrient information presented in grams or milligrams. Second, reference information allows consumers not only to judge whether an attribute level is high relative to others, but also to judge whether these levels are generally too high, too low, or inconsequential. As a result, reference information minimizes problems due to context effects.³

³An example of reference information unrelated to nutrition is the annual fuel utilization efficiency (AFUE) rating, the percentage of a furnace's energy converted to usable heat over a full year's operation. This percentage assumes little knowledge (only that the AFUE for a new furnace is 100 percent), does not restrict consumers to making comparisons on the basis of alternatives that are presently available, and permits across-product category comparisons (e.g., oil furnaces compared to gas furnaces).

Because reference information is independent of prior knowledge and easier to encode, it should enhance consumers' ability to process and their actual comprehension levels. Consequence information is also important to encoding because it assists consumers in interpreting reference information (i.e., providing the negative consequences associated with a particular attribute would enable consumers to more accurately evaluate levels of this attribute). Finally, consequence and reference information should also improve decision quality because consumers have knowledge of relevant health consequences and are directed to process nutrition information in an easily encoded, context-free format. Therefore,

H2: Nutrition disclosures containing reference information and consequence information evoke higher ability to process, higher information comprehension, and higher decision quality than do disclosures not containing both types of information.

The Effects of Consumer Characteristics

Understanding the relationships among stimulus characteristics and consumer characteristics that influence nutrition information utilization is important in deciding whether a given disclosure is effective for all consumers or whether multiple policies or marketing programs are needed.⁴ Moreover, finding stimulus characteristics that facilitate processing because they meet most consumers' needs and capabilities means that more consumers will have the opportunity to benefit from information disclosures.

Various consumer characteristics have been shown to affect the processing of nutrition information. The consumer characteristics investigated in this study are: nutrient familiarity, enduring motivation, enduring ability, education, age, and preventive orientation. Only nutrient familiarity was manipulated in the experiment; the other characteristics were measured. Familiarity was manipulated for two reasons. First, other research has demonstrated that familiarity is a critical determinant of the type and extent of consumer information-processing activities. Notably, Bettman and Park (1980) found that consumers with moderate levels of prior knowledge acquired the highest levels of information. Johnson and Russo (1984) found that high familiarity resulted in high processing and recall in a judgment task and that moderate familiarity resulted in high processing and recall in a choice task. Second, nutrient familiarity was isolated to ensure that the experimental effects were due to the stimulus characteristics and not to prior knowledge. Manipulating

⁴Information in the form of disclosures is only one option available to alter consumers' behaviors. Other policy options include restricting distribution or use of the product, and banning the product altogether.

familiarity allowed its effects to be assessed more systematically.

According to previous research, nutrient familiarity should encourage nutrition information utilization up to a moderate level, at which point increases in familiarity reduce utilization. However, because familiarity was a familiar/unfamiliar manipulation, it was not possible to assess the effect of moderate levels of familiarity on information utilization. Therefore,

H3: Nutrition disclosures containing familiar information evoke higher motivation and ability to process, information acquisition, information elaboration, information comprehension, and decision quality than do disclosures containing unfamiliar information.

Among the unmanipulated consumer characteristics, enduring motivation reflects involvement with nutrition information and enduring ability reflects nutrition knowledge. These characteristics were investigated because past research typically has focused on involvement and knowledge as key predictors of information-processing activities. Still other research has pointed to the role of age and education in processing nutrition information (Cole and Gaeth 1990; Jacoby et al. 1977). Finally, preventive orientation (i.e., the extent to which consumers believe they should manage their health prior to the appearance of a problem) was included as a consumer characteristic because of its possible link with nutrition information utilization.

Because consequence and reference information assume no prior knowledge and contain relevant information that is easily encoded, these stimulus characteristics should encourage higher levels of nutrition information utilization despite consumer differences in enduring motivation, enduring ability, education, age, and preventive orientation. Therefore,

H4: Across a diversity of consumer characteristics, nutrition disclosures containing consequence information evoke higher motivation to process, higher information acquisition, higher information elaboration, and higher decision quality than do disclosures not containing consequence information.

H5: Across a diversity of consumer characteristics, nutrition disclosures containing consequence and reference information evoke higher ability to process, higher information comprehension, and higher decision quality than do disclosures not containing consequence and reference information.

METHOD

Design

A $3 \times 2 \times 2$ between-subjects factorial design using consequence information (high, low, control), refer-

ence information (present, absent), and nutrient familiarity (familiar, unfamiliar) as design factors was used to test the hypotheses. Several of the hypotheses were also tested with measures of enduring motivation, enduring ability, preventive orientation, age, and education.

Subjects

Subjects were selected from an exhaustive list of staff personnel at a northeastern university. Because of the nature of the research, population members employed at medical or health-related facilities were removed from the list. After a systematic sample of 274 people was obtained, a letter describing the research and requesting participation in the experiment was mailed along with \$1 as an incentive. Potential participants were told they could keep the dollar and that their names would be entered in a lottery to win \$200, \$100, or \$50 if they participated. Of those sent a letter, 180 subjects completed the experiment, translating into a 65.7 percent completion rate.

Procedure

Subjects were required to complete a pre-experimental questionnaire sent with the letter of introduction. This questionnaire included measures of enduring motivation and ability to process health and nutrition information, as well as a variety of shopping-related questions meant to disguise the exact nature of the research.

Subjects were randomly assigned to experimental conditions. For the actual experiment, subjects read a deceptive cover story informing them that the research was sponsored by a national retailer investigating how consumers choose among products. Following this, they went through a protocol warm-up procedure by making an automobile choice while thinking aloud. Subjects then read over a supplied shopping list (which included the two experimental products) and an information sheet for each of the products to be purchased.

The two product classes used in this research, hot dogs and margarine, were chosen on the basis of (1) consumers' familiarity with the product class and (2) consumers' perceptions that the products contained high nutrient levels. Familiarity was selected as a criterion to enhance the ecological validity of the shopping simulation. The second criterion was chosen because results of a focus-group pretest had indicated that consumers may not attend to nutrient information unless they perceive the nutrient levels to be high. The two product classes of hot dogs and margarine were found in pretests to adequately meet both criteria and, hence, were selected as experimental stimuli.

The product information sheets included general product category information drawn from *Consumer*

Reports and the consequence information manipulation. After reading this information, subjects entered a simulated shopping site that consisted of two aisles. Subjects could choose from among five brands for each of the two product classes. Mock brand names and logos were used on the brands. The reference information manipulation was included on the product label below the actual nutrient levels.⁵ Subjects chose one brand from each product class while protocol information was collected. After subjects had made their choices and left the shopping area, a questionnaire measuring motivation, ability, and consumer characteristics was administered. Upon completing the questionnaire, subjects were informed of the true nature of the experiment and dismissed.

Independent Variables

Consequence Information. Consequence information communicated the health dangers of excessive nutrient consumption (i.e., arousal manipulation) and made recommendations for overcoming these dangers (i.e., the recommendation manipulation). The possibility of curvilinear relationships between exposure to consequence information and information-processing outcomes suggested the need to manipulate three paired levels (i.e., high, low, and control) of the arousal and recommendation components of consequence information (see Exhibit 1 for the actual manipulations).⁶ All three conditions of the arousal component noted that the product contained an added negative nutrient. In the no-arousal (control) condition, no other information was provided. In the low-arousal condition, the manipulation stated that the American Medical Association had found that the nutrient might be linked to health problems. In the high-arousal condition, the manipulation stated that the American Medical Association had confirmed that a series of health problems were fostered by the nutrient. For the recommendation manipulation, the control group received no instructions; the low-recommendation group was told only to observe moderation in their consumption of the nutrient, and the high-recommendation group was given explicit instructions to look for the nutrient's RDA and to stay within the suggested daily allowance.

Reference Information. Reference information was operationalized as the presence or absence of the RDA percentage for the target nutrient (e.g., 50 percent RDA). When present, reference information was placed on the product labels with other RDA infor-

EXHIBIT 1

CONSEQUENCE-INFORMATION MANIPULATIONS

Unfamiliar nutrient:

High: Margarine (hot dogs) contain(s) added pyridoxine (vitamin B₆). The American Medical Association has recently confirmed the severe health problems associated with excessive pyridoxine and warns consumers that excessive pyridoxine consumption creates a dangerously irregular heart beat causing fatal and premature heart disease. Please look for the pyridoxine recommended daily allowance (RDA) on the nutrition label and stay within your pyridoxine allowance for the day. Your health risks will be lessened greatly.

Low: Margarine (hot dogs) contain(s) added pyridoxine (vitamin B₆). The American Medical Association has found that excessive pyridoxine may be linked to the onset of health problems. Observe moderation in your pyridoxine consumption.

Control: Margarine (hot dogs) contain(s) added pyridoxine (vitamin B₆).

Familiar nutrient:

High: Margarine (hot dogs) contain(s) added sodium. The American Medical Association has recently confirmed the severe health problems associated with excessive sodium and warns consumers that excessive sodium consumption creates dangerously high blood pressure, causing fatal and premature heart disease. Please look for the sodium recommended daily allowance (RDA) on the nutrition label and stay within your sodium allowance for the day. Your health risks will be lessened greatly.

Low: Margarine (hot dogs) contain(s) added sodium. The American Medical Association has found that excessive sodium may be linked to the onset of health problems. Observe moderation in your sodium consumption.

Control: Margarine (hot dogs) contain(s) added sodium.

mation (e.g., vitamin and mineral information). In both the present and absent conditions, actual nutrient levels (in milligrams) were available.

Nutrient Familiarity. The nutrient familiarity variable used sodium as the familiar nutrient and pyridoxine as the unfamiliar one. Consumers are generally knowledgeable about sodium's health effects (Heimbach 1987), but pyridoxine is unknown to the general public. Pyridoxine is actually Vitamin B₆. Moderate levels of both sodium and pyridoxine are necessary for good health, but their overconsumption causes negative health consequences.

Consumer Characteristics. Enduring motivation and ability to process nutrition information were measured two weeks prior to the experiment. The enduring motivation measures involved three questions regarding the extent to which subjects were interested in processing nutrition information (see Exhibit 2). The enduring ability measures asked subjects to match 10 nutrients to 10 health-related outcomes (e.g., saturated fats to cardiovascular disease). It is important that enduring motivation and ability were discrimi-

⁵This is the typical location for an RDA percentage.

⁶Logically, to test for the possibility of a curvilinear relationship, a moderate level should have been included in the design. However, pretesting showed no differences between moderate and high levels of consequence information. Therefore, high, low, and control levels were used to allow for the possibility of a curvilinear relationship.

EXHIBIT 2

MEASURES OF CONSUMER CHARACTERISTICS
AND DEPENDENT VARIABLES

-
- Enduring motivation to process:
- How often do you read nutritional labels?
 - How interested are you in reading nutrition and health-related information at the grocery store?
 - How often do you read nutrition labels at the grocery store?
- Preventive orientation:
- I try to protect myself against health hazards I hear about.
 - I am concerned about health hazards and try to take action to prevent them.
 - I try to prevent health problems before I feel any symptoms.
- Curative orientation:
- I don't worry about health hazards until they become a problem for me or someone close to me.
 - There are so many things that can hurt you these days. I'm not going to worry about them.
 - I often worry about the health hazards I hear about, but don't do anything about them.
 - I don't take any action against health hazards I hear about until I know I have a problem.
 - I'd rather enjoy life than try to make sure I'm not exposing myself to a health hazard.
 - I don't think health hazards I hear about will happen to me.
- Motivation to process:^a
- I am interested in looking for (target nutrient)^b information on hot dog labels.
 - I am interested in looking for (target nutrient) information on margarine labels.
 - I would like to receive additional (target nutrient) information about hot dogs.
 - I would like to receive additional (target nutrient) information about margarine.
 - I intend to pay attention to (target nutrient) information while shopping.
- Ability to process:^a
- Looking at the (target nutrient) information on the attached nutritional disclosures, how meaningful is it to you?
 - Looking again at the (target nutrient) information, how much meaning does it have for you in your food selections?
 - Using this same information, how confident are you about your ability to use the (target nutrient) information in food choices?
 - How confident are you about your answer to (question asking subjects to assign an ideal level of the target nutrient to a single hot dog)?
-

^a These variables are stimulus induced.

^b Sodium or pyridoxine was used on the actual questionnaire instead of "target nutrient."

nated from stimulus-induced motivation and ability during measure validation. Moreover, enduring motivation had adequate reliability ($\alpha = .92$). Enduring ability was a single score and, therefore, was not assessed for reliability.

Preventive orientation was assessed originally on a nine-item scale (e.g., "I try to prevent health problems before I feel any symptoms"). However, during measure validation, results of the factor analysis indicated that only three of the nine items loaded on the preventive factor; the other six loaded on another factor. The six items loading on the second factor reflected a more curative orientation, the extent to which health

problems are managed after symptoms appear (e.g., "I don't take action against health hazards I hear about until I know I have a problem"). Reliability estimates for the two separate scales were adequate ($\alpha = .76$ for preventive orientation and $\alpha = .80$ for curative orientation), unlike the reliability estimate for the original nine-item preventive scale ($\alpha = .51$). Exhibit 2 summarizes the measures used for all the consumer characteristics and the dependent measures.

Dependent Variables

The dependent measures were assessed from protocol tapes, questionnaire responses, or actual behaviors.

Motivation and Ability to Process. Motivation and ability to process represent subjects' motivation and ability levels following exposure to the experimental stimuli (i.e., they are stimulus-induced states). Motivation was evaluated by means of five seven-point Likert scales (e.g., "I am interested in looking for sodium information on margarine labels"); ability to process was evaluated on four seven-point Likert scales (see Exhibit 2 for specific items). The alphas for motivation ($\alpha = .94$) and ability ($\alpha = .76$) were adequate.

Information Acquisition and Elaboration. Information acquisition and elaboration for the target nutrients were measured using protocol transcripts. The protocol tapes were analyzed by the experimenter and two graduate students blind to the conditions. On the basis of the size of the task, each graduate student analyzed only half the tapes, while the experimenter analyzed all the tapes. There was 80 percent interjudge agreement in classifying processing activities, and disagreements were resolved by discussing the protocol.

Acquisition or search activities were denoted by subjects' attending to target nutrient information (e.g., "I am looking at the sodium information on brand X"). Information elaboration was measured by counting the number of times target nutrient information was processed, evaluated, extended, or reflected on in any manner during the shopping trip (e.g., "My father has a problem with his high blood pressure, so I watch my sodium intake"). Elaboration was differentiated from acquisition when the attribute was reprocessed without being reacquired by subjects. For example, a subject might say, "I'm looking at the sodium level on Family Farm margarine, and 500 milligrams seems high to me. But 500 milligrams isn't really high compared to the margarine I typically purchase." In this case, the coder would record one acquisition (i.e., "I'm looking at the sodium level on Family Farm margarine") and two elaborations (i.e., "500 milligrams seems high to me" and "500 milligrams isn't really high compared to the margarine I typically purchase").

During measure validation, factor analysis results indicated that the acquisition and elaboration items

loaded onto a single factor. In light of this empirical finding and the fact that acquisition and elaboration are conceptually linked (see Fig. 1), items measuring these variables were combined in subsequent analyses. Together, the items had adequate reliability ($\alpha = .78$).

Information Comprehension. Subjects completed three questions measuring comprehension accuracy with the aid of a hot dog label attached to their questionnaires. This label contained the reference information manipulation that subjects had been given in their experimental conditions. Subjects were asked to calculate (1) the milligrams of the target nutrient that are recommended on a daily basis for the average consumer (RECOM), (2) the number of servings of hot dogs that would fulfill the daily requirement for the target nutrient (SERVE), and (3) the milligrams of the target nutrient that should be in one hot dog (REA-SON). Subjects' answers to each of these questions were subtracted from the correct answers, and the absolute differences were used in the analyses to reflect comprehension accuracy. Therefore, the smaller the absolute difference, the greater the comprehension accuracy. During measure validation, factor analysis loaded all three items onto a single factor; however, because their combined reliability was not adequate ($\alpha = .61$), each measure was assessed independently in the analyses.

Decision Quality. Two measures of decision quality were used. An objective measure of decision quality was derived by gathering ratings of each brand's overall nutritional quality from a group of experts. Eight professors of nutrition were asked to rate each brand on a seven-point Likert scale where 7 was "high quality" and 1 was "low quality." The mean of these eight evaluations was assigned to each subject's actual choice.

In accordance with Jacoby, Speller, and Kohn (1974), the subjective measure asked subjects to imagine their ideal brand and choose the attribute level, from among five levels offered, that most closely approximated their ideal attribute levels. This process was repeated for a series of brand attributes, including the target nutrient. Euclidean distances between these ideal levels and a subject's actual choice levels were calculated and weighted by an importance measure for each attribute. These weighted distances were then summed across the brand attribute levels and assigned as the subject's subjective measure of quality. In this case, the smaller the distance, the smaller the deviation between the actual and ideal choices and the higher the decision quality.

RESULTS

Manipulation Checks

The consequence information manipulations were assessed on seven-point Likert scales asking subjects

to rate how specific the recommendation component of the information was and how concerned they were about the health hazard described in the arousal component. To test for the perception of the intended differences in recommendation specificity and arousal levels, two analyses of variance were performed. Significant main effects were found in both cases ($F(2,168) = 5.72, p < .005$ for recommendation, and $F(2,168) = 10.98, p < .001$ for arousal). Analysis of the marginal means revealed that the high levels of arousal ($\bar{X} = 5.73$) and recommendation ($\bar{X} = 4.80$) were significantly different from the low levels of arousal ($\bar{X} = 4.65$) and recommendation ($\bar{X} = 3.76$). These values, in turn, were significantly different from those of the control condition, which did not contain arousal ($\bar{X} = 3.52$) or recommendation ($\bar{X} = 3.12$) information.

The effectiveness of the reference information manipulation was assessed on a seven-point Likert scale asking subjects to rate how understandable they perceived label information to be for each product. These measures failed to register the desired effects in the final experiment, although pretesting had shown significantly improved evaluations for those labels containing reference information ($\bar{X} = 5.00$) compared with those lacking reference information ($\bar{X} = 3.16$) ($F(1,39) = 8.237, p = .007$). However, in the pretest, subjects evaluated only the manipulation, whereas, in the final study, subjects completed a five-page questionnaire after completion of the shopping simulation, but prior to evaluating the manipulation. Given these conditions, failure to measure the manipulation adequately was attributed to subject fatigue.

Tests of Hypotheses

The hypotheses were tested in two phases. First, a $3 \times 2 \times 2$ MANOVA model was used to test the main and interaction effects in Hypotheses 1–3. The MANOVA was chosen because several of the dependent measures were expected to be correlated. For example, motivation and elaboration are related because they are concerned with readiness to process and amount of actual processing, respectively; ability and comprehension are both concerned with encoding, and both subjective and objective decision quality reflect behavioral manifestations of the information utilization process. Second, a MANCOVA model was used to test the hypothesized lack of interaction between the consumer and stimulus characteristics (Hypotheses 4 and 5). Results are summarized in Tables 1 and 2.

Consequence information had a strong effect on the motivation and elaboration variables, which supported Hypothesis 1. The univariate tests for both were also significant. The marginal means indicated that high levels of consequence information evoked the highest motivation ($\bar{X} = 4.48$) and elaboration ($\bar{X} = 3.10$) levels, followed by the effects of low-consequence information on motivation ($\bar{X} = 4.39$) and elaboration ($\bar{X}$

TABLE 1
THE EFFECTS OF STIMULUS CHARACTERISTICS ON NUTRITION INFORMATION UTILIZATION (MANCOVA MODEL)

Dependent variables	Wilks's λ	df	Approximate F
Motivation/elaboration:			
Consequence information	.806	4,306	8.688***
Motivation		2,154	15.868***
Elaboration		2,154	15.025***
Familiarity	.976	2,153	1.844
Ability/comprehension accuracy: ^a			
Consequence information	.914	4,136	3.197**
Ability		1,139	7.534**
SERVE		1,139	1.619
RECOM		1,139	.834
REASON		1,139	3.249
Reference information ^b	.976	4,136	.822
Familiarity	.894	4,136	4.031**
Ability		1,139	10.628***
SERVE		1,139	.611
RECOM		1,139	.444
REASON		1,139	3.710
Consequence by reference	.931	4,136	2.501*
Ability		1,139	.035
SERVE		1,139	4.885*
RECOM		1,139	4.309*
REASON		1,139	1.706
Consequence by reference by familiarity ^c	.923	4,136	2.821*
Ability		1,139	.032
SERVE		1,139	7.786**
RECOM		1,139	8.311**
REASON		1,139	1.561
Reference by education ^c	.856	4,136	5.688***
Ability		1,139	.853
SERVE		1,139	18.651***
RECOM		1,139	18.855***
REASON		1,139	.873
Decision quality:			
Consequence information	.849	8,282	2.989**
Objective margarine quality		2,144	6.998***
Objective hot dog quality		2,144	2.158
Subjective margarine quality		2,144	4.361*
Subjective hot dog quality		2,144	4.565*
Familiarity	.973	4,141	.956
Consequence by reference	.933	8,282	1.243

^a A bilevel version of consequence information was used to reflect that it is the presence or absence of consequences that is relevant.

^b This multivariate test was significant in the MANOVA model (Wilks's $\lambda = .929$, $F(4,143) = 2.731$, $p = .031$).

^c Only significant covariate-by-stimulus-characteristics interactions are reported.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

= 2.97). The control condition resulted in the lowest effects on motivation ($\bar{X} = 3.15$) and elaboration ($\bar{X} = 1.37$).

Consequence information also had a significant effect on decision quality. In this case, the univariate tests for the subjective measures of margarine and hot dog quality and the objective measure of margarine quality were significant. The objective measure of hot dog quality was not significant. For each significant test, high consequence information yielded the highest-quality decision making ($\bar{X} = 6.95$), followed by low consequence information ($\bar{X} = 7.29$) and the control

condition ($\bar{X} = 7.64$). Recall that lower scores reflect higher performance.⁷

Hypothesis 2 was partially supported. The interaction of consequence and reference information was significant for the ability and comprehension variables. The univariate tests indicated that the interaction was significant for two of the three comprehension measures, SERVE and RECOM, but not for REASON or for ability to process. Figure 2 depicts the consequence-

⁷Reported decision-quality means are for subjective margarine quality.

FIGURE 2

THE INTERACTION OF CONSEQUENCE AND REFERENCE INFORMATION ON COMPREHENSION ACCURACY

by-reference-information interaction for SERVE. As shown, the absence of consequences has similar effects on comprehension, regardless of whether reference information is present ($\bar{X} = 2.52$) or absent ($\bar{X} = 2.13$). However, when consequences are present, reference information maximizes comprehension accuracy ($\bar{X} = 1.83$), and its absence worsens comprehension accuracy considerably ($\bar{X} = 2.57$). Note that a lower comprehension score indicates higher performance in Figure 2.

With regard to Hypothesis 2, there was also a main effect for consequence information on the ability and comprehension variables. The univariate tests indicated a significant effect for consequences ($\bar{X} = 4.89$) compared with lack of consequences ($\bar{X} = 4.35$) on ability to process, but no effect for consequence information on comprehension accuracy (see Table 1). Finally, there was a main effect for reference information on the ability and comprehension variables. Univariate tests indicated a significant effect for SERVE and REASON. As expected, reference information increased comprehension accuracy ($\bar{X} = 1.98$) compared with lack of reference information ($\bar{X} = 2.55$) for SERVE. Finally, the consequence-by-reference interaction had no effect on decision quality.

Very little support was found for the effect of familiarity on nutrition information utilization (Hy-

FIGURE 3

THE INTERACTION OF CONSEQUENCE INFORMATION, REFERENCE INFORMATION, AND FAMILIARITY ON COMPREHENSION ACCURACY

pothesis 3). Familiarity had a nonsignificant effect on motivation, elaboration, and decision quality but had a significant effect on ability and comprehension. When the univariate tests were inspected, only ability to process was significant. As expected, subjects evaluated themselves as more able to process familiar information ($\bar{X} = 5.02$) than unfamiliar information ($\bar{X} = 4.22$).

Hypotheses 4 and 5 were partially supported. A MANCOVA model was used to test for the effects of the two stimulus characteristics on nutrition information utilization with the introduction of the consumer characteristics as covariates. Prior to a test of the MANCOVA model, the assumption of no interaction between the covariates and the design factors was tested. No interactions were found between familiarity and consequence information for motivation, elaboration, or decision quality. There was, however, a significant three-way interaction between consequence information, reference information, and familiarity on the ability and comprehension variables (see Table 1). The univariate tests indicated that the interaction was significant for SERVE and RECOM.

Figure 3 depicts this interaction. As shown there, familiarity increases comprehension accuracy when consequences are present ($\bar{X} = 2.19$) as opposed to absent ($\bar{X} = 2.33$). Comprehension increases even further when reference information accompanies consequences about a familiar nutrient ($\bar{X} = 1.61$) as opposed to an unfamiliar nutrient ($\bar{X} = 2.06$). When the nutrient is unfamiliar and reference and consequence information is lacking, comprehension is poor ($\bar{X} = 3.10$). However, comprehension improves with consequences ($\bar{X} = 2.38$) and with consequences and reference information ($\bar{X} = 2.06$) for unfamiliar nutrients. No interactions were found for decision quality.

A significant interaction was also found between education and reference information on the ability and comprehension variables (see Table 1). Two measures of comprehension accuracy were significant (SERVE and RECOM). Figure 4 depicts this interaction. As presented there, reference information dramatically increases the comprehension accuracy (from $\bar{X} = 2.49$ to $\bar{X} = 1.02$) of subjects with some graduate education (+17 years). Reference information also increases the comprehension accuracy (from $\bar{X} = 2.33$ to $\bar{X} = 1.52$) of university-level subjects (13–16 years), but less dramatically than for those with some graduate education. Finally, reference information slightly reduces comprehension accuracy (from $\bar{X} = 2.25$ to $\bar{X} = 2.27$) of consumers with high school educations only (11–12 years).

On the basis of these results, the MANCOVA models were tested for all but the significant interactions. Results supported Hypotheses 4 and 5. Significant relationships between the stimulus characteristics and nutrition information utilization remained significant with the covariates in the model. Therefore, with the exception of the two significant interactions on ability and comprehension (see Table 1), the stimulus characteristics influenced processing and behavioral outcomes irrespective of individual consumer differences.

DISCUSSION

This research suggests that effectively designed nutrition disclosures facilitate information utilization. Specifically, as consequence information becomes more arousing and specific in its instructions, consumers are more motivated and able to process information, elaborate upon it to a greater extent, and make better decisions. Consequence information does not, however, affect information comprehension levels. Therefore, even without adequate comprehension, consumers who are aroused and provided with behavioral recommendations process more nutrition information and make better choices, as evaluated by both their own and experts' standards. In contrast, reference information affected only consumers' comprehension levels. Hence, reference information appears to play a more limited role in the utilization of nutrition information.

FIGURE 4
THE INTERACTION OF REFERENCE INFORMATION AND EDUCATION ON COMPREHENSION ACCURACY

Future research directed at understanding these and other effects of stimulus characteristics would greatly benefit both managers and policymakers. One recommendation to correct a limitation of this research is to eliminate the confound between consequence information and message length. In the present study, message length was increased inadvertently in attempting to achieve differences in arousal and specificity. A related recommendation for future research, also reflecting a limitation of the present study, is to ensure that changes in message arousal do not change message specificity. Finally, failure to generate strong effects from reference information may, in part, be due to the rather weak nature of the manipulation and manipulation check. Future research should incorporate stronger manipulations and more effective checks than the ones used here.

The findings for the effects of familiarity run counter to past research. Familiarity causes consumers to evaluate themselves as more able to process information; however, it does not improve their actual acquisition, elaboration, and comprehension of that information, or the quality of their decisions. In other words, it appears that familiarity breeds an illusion of being more informed than one really is and, therefore, reduces

further processing. In practice, this suggests that disclosures containing familiar information, but requiring more information processing, will need to incorporate some means of encouraging further processing (e.g., additional novel cues). Finally, because the familiarity manipulation in this research taps two extremes on a continuum of familiarity (i.e., familiar and unfamiliar), the fact that familiarity had no effect on actual processing and decision quality may not be too surprising. Recall that both Johnson and Russo (1984) and Bettman and Park (1980) found higher levels of information processing at moderate familiarity levels. Future research should be designed to test the effects of moderate levels of disclosure familiarity.

It is interesting that familiarity did not interact with consequence information to affect motivation, elaboration, or decision quality. This finding suggests that the effects of consequence information are independent of familiarity levels. This result is important because stimulus characteristics, such as consequence information, that can enhance information utilization regardless of consumers' prior knowledge levels are more powerful tools of information design.

The findings that stimulus characteristics' effects are invariant across a diversity of consumers is important for several other reasons as well. First, past research has stressed consumer characteristics as predictors of disclosure processing or has found processing effects only for consumers with certain characteristics (Federal Trade Commission 1979; Jacoby et al. 1977). Hence, demonstrating the effectiveness of stimulus characteristics despite these consumer characteristics may broaden our objectives in designing information disclosures. Second, from an equity perspective, *all* consumers should have the opportunity to benefit from information disclosures. Therefore, if a consumer finds a disclosure irrelevant or incomprehensible because of a characteristic unique to that consumer or a group of consumers, the disclosure is not equitable. Third, the benefits of efficient markets (which depend on complete information flows) may not be reaped by uneducated consumers, consumers who are not information-sensitive, or consumers who are physically and psychologically isolated (Moorman and Price 1989). Hence, ensuring that consumers can benefit from disclosures independent of these larger market forces is important.

The interactions discovered between consumer and stimulus characteristics suggest that there are, however, a few qualifications for stimulus characteristics' effects. For example, the three-way interaction of consequence information, reference information, and familiarity indicates that comprehension is more susceptible to the influence of prior knowledge levels than other information utilization activities. Together with the finding that there is no interaction between familiarity and consequence information, this suggests that sequentially disseminating unfamiliar nutrition infor-

TABLE 2
THE EFFECTS OF CONSUMER CHARACTERISTICS
ON UTILIZATION OF NUTRITION INFORMATION
(MANCOVA MODEL)

Dependent variables	Beta	SE	<i>t</i>
Motivation:			
Curative orientation	-.369	.106	4.433*
Preventive orientation	.020	.096	.251
Age	.107	.013	1.479
Education	-.178	.050	2.352*
Enduring motivation	.088	.081	1.075
Enduring ability	.123	.048	1.618**
Elaboration:			
Curative orientation	-.307	.142	3.492*
Preventive orientation	.063	.128	.734
Age	-.011	.017	.146
Education	-.044	.067	.550
Enduring motivation	.009	.108	.110
Enduring ability	.125	.064	1.559
Ability:			
Curative orientation	-.141	.094	1.556
Preventive orientation	-.021	.087	.241
Age	.214	.011	2.721*
Education	-.249	.043	3.051*
Enduring motivation	.213	.072	2.371*
Enduring ability	.086	.041	1.044
Comprehension accuracy: ^a			
Curative orientation	-.069	.475	.730
Preventive orientation	.016	.440	.180
Age	.175	.060	2.119*
Education	-.193	.221	2.249*
Enduring motivation	-.088	.368	.940
Enduring ability	-.060	.212	.697
Subjective decision quality: ^{a,b}			
Curative orientation	.351	.143	3.805*
Preventive orientation	-.036	.120	.416
Age	-.068	.016	.881
Education	.010	.062	.134
Enduring motivation	-.067	.104	.755
Enduring ability	-.057	.060	.712
Objective decision quality: ^b			
Curative orientation	-.214	.076	2.201*
Preventive orientation	.000	.063	.003
Age	.043	.009	.525
Education	-.480	.033	1.736**
Enduring motivation	.106	.055	1.131
Enduring ability	.039	.032	.459

^a Lower scores reflect higher performance.

^b Although subjective and objective measures of decision quality are presented separately, a multivariate model was used to assess their effects. Margarine choices are illustrated in both cases.

* $p < .05$.

** $p < .01$.

mation, beginning with consequence information and following with reference information after consumers gain some familiarity with the attribute and its effects, will maximize comprehension.

These stimulus and consumer characteristics interactions also have other, more general implications for information design. Multiple programs may need to be developed to meet consumers' differing needs (see Capon and Lutz 1979). For example, since reference

information failed to alter processing for consumers with low education levels, policymakers could target consumers with high or moderate education levels with information remedies, while utilizing information remedies and education remedies to meet the needs of uneducated consumers. More generally, both education and information approaches might be necessary for consumers unfamiliar with the stimulus, while only information remedies are necessary when familiarity can be assured among the target population.

A second implication is that policymakers and managers might have to choose among consumer groups in targeting information campaigns (e.g., target either more educated or less educated consumers if resources are not available to develop multiple programs). Choosing among consumer groups, in turn, may raise some equity concerns.

Several consumer characteristics also independently affect nutrition information utilization (see Table 2). For example, education negatively influences motivation, ability, comprehension, and objective decision quality. In the case of motivation, educated consumers may already have sufficient information and, hence, are less motivated to search for more. In the case of ability, education may have increased consumers' awareness of what they do not know, causing them to rate themselves lower in terms of ability. An incongruity between educated consumers' standards and the experts' standards may be one explanation for the negative relationship between education and objective decision quality. Finally, as expected, education is negatively related to comprehension, indicating that as education increases, comprehension levels decrease (recall that lower levels equate with higher comprehension).

With regard to age, results indicate that it is positively related to ability to process and comprehension accuracy. This suggests that aging increases consumers' perceptions of their abilities but worsens their actual comprehension levels. Other findings regarding consumer characteristics are that enduring motivation has a positive effect on ability to process, and that enduring ability has a positive effect on motivation to process (see Table 2). These findings point to the reciprocal effects of motivation and ability noted by previous research (Lutz, MacKenzie, and Belch 1983).

This research developed a measure of consumers' curative orientations that is independent of their preventive orientations. Unlike preventive orientation, curative orientation was found to have significant negative effects on a full range of information-utilization activities (see Table 2). Future research should investigate how, why, and under what conditions this orientation affects health and nutrition information utilization. Moreover, exploring other consumer characteristics that may be related to curative orientation (such as age, health, locus of control, or values promoting this orientation) may further explain its

presence and provide direction for overcoming its deleterious effects on health maintenance.

Finally, marginal differences in subjective and objective measures of decision quality suggest the need to assess both measures in future research. These differences raise the question of whether experts, consumers, or both experts and consumers should evaluate the quality of consumers' decisions. One scenario, incorporating both expert and consumer judgments, might include collecting longitudinal measures of consumers' diets rather than relying on a single brand choice or a single trip to the grocery store. Experts might then be asked to rate brand choices within this broader context. Another scenario might use the subjective measure of decision quality, but permit experts to assign each consumer's ideal attribute levels. This approach would still allow consumers to choose brands with differing attribute levels and to rate attribute importance levels.

[Received August 1989. Revised June 1990.]

REFERENCES

- Bettman, James R. and C. Whan Park (1980), "Effects of Prior Knowledge and Experience and Phase of the Choice Process on Consumer Decision Processes: A Protocol Analysis," *Journal of Consumer Research*, 7 (December), 234-248.
- Brucks, Merrie, Andrew A. Mitchell, and Richard Staelin (1984), "The Effect of Nutritional Information Disclosure in Advertising: An Information Processing Approach," *Journal of Public Policy and Marketing*, 3, 1-27.
- Burnkrant, Robert E. and Alan G. Sawyer (1983), "Effects of Involvement and Message Content on Information Processing Intensity," in *Information Processing Research in Advertising*, ed. Richard J. Harris, Hillsdale, NJ: Erlbaum, 43-64.
- Capon, Noel and Richard J. Lutz (1979), "A Model and Methodology for the Development of Consumer Information Programs," *Journal of Marketing*, 43 (January), 58-67.
- Celsi, Richard L. and Jerry C. Olson (1988), "The Role of Involvement in Attention and Comprehension Processes," *Journal of Consumer Research*, 15 (September), 210-224.
- Cole, Catherine A. and Gary J. Gaeth (1990), "Cognitive and Age-related Differences in the Ability to Use Nutritional Information in a Complex Environment," *Journal of Marketing Research*, 37 (May), 175-184.
- Daly, Patricia A. (1976), "The Response of Consumers to Nutritional Labeling," *Journal of Consumer Affairs*, 10 (Winter), 170-178.
- Evans, Richard I., Richard M. Rozelle, Thomas M. Lasater, Theodore M. Dembroski, and Bem P. Allen (1970), "Fear Arousal, Persuasion, and Actual versus Implied Behavioral Change," *Journal of Personality and Social Psychology*, 16 (2), 220-227.
- Federal Trade Commission (1979), *Consumer Information Remedies*, Washington, DC: Government Printing Office.

- Greenwald, Anthony G. and Clark Leavitt (1984), "Audience Involvement in Advertising: Four Levels," *Journal of Consumer Research*, 11 (June), 581-592.
- Gutman, Jonathan (1982), "A Means-End Chain Model Based on Consumer Categorization Processes," *Journal of Marketing*, 46 (Spring), 60-72.
- Heimbach, James T. (1987), "Risk Avoidance in Approaches to Food Choice," *Clinical Nutrition*, 6, 159-162.
- and Raymond C. Stokes (1982), "Nutrition Labeling and Public Health: Survey of American Institute of Nutrition Members, Food Industry, and Consumers," *Journal of Clinical Nutrition*, 36 (October), 200-208.
- Jacoby, Jacob, Richard W. Chestnut, and William Silberman (1977), "Consumer Use and Comprehension of Nutrition Information," *Journal of Consumer Research*, 4 (September), 119-128.
- , Donald E. Speller, and Carol A. Kohn (1974), "Brand Choice Behavior as a Function of Information Load," *Journal of Marketing Research*, 11 (February), 63-69.
- Johnson, Eric J. and J. Edward Russo (1984), "Product Familiarity and Learning New Information," *Journal of Consumer Research*, 11 (June), 542-550.
- Keller, Kevin L. and Richard Staelin (1987), "Effects of Quality and Quantity of Information on Decision Effectiveness," *Journal of Consumer Research*, 14 (September), 200-213.
- Leventhal, Harold (1970), "Findings and Theory in the Study of Fear Communications," in *Advances in Experimental Social Psychology*, ed. Leonard Berkowitz, New York: Academic Press.
- Levy, Alan S., Odonna Matthews, Marilyn Stephenson, Janet E. Tenney, and Raymond E. Schuker (1985), "The Impact of a Nutrition Information Program on Food Purchases," *Journal of Public Policy and Marketing*, 4, 1-13.
- Lutz, Richard J., Scott B. MacKenzie, and George E. Belch (1983), "Attitude toward the Ad as a Mediator of Advertising Effectiveness: Determinants and Consequences," in *Advances in Consumer Research*, Vol. 10, ed. Richard P. Bagozzi and Alice M. Tybout, Ann Arbor, MI: Association for Consumer Research, 532-539.
- MacInnis, Deborah J. and Bernard J. Jaworski (1990), "Two-Routes to Persuasion Models in Advertising: Review, Critique and Research Directions," in *Review of Marketing*, ed. Valarie Zeithaml, Chicago: American Marketing Association, forthcoming.
- Moorman, Christine and Linda L. Price (1989), "Consumer Segment Interactions and Consumer Policies," *Journal of Public Policy and Marketing*, 8, 181-203.
- Muller, Thomas E. (1985), "Structural Information Factors Which Stimulate the Use of Nutrition Information: Field Experiment," *Journal of Marketing Research*, 22 (May), 30-142.
- Petty, Richard W. and James T. Cacioppo (1986), *Communication and Persuasion: Central and Peripheral Routes to Attitude Change*, New York: Springer.
- Ray, Michael L. and William L. Wilkie (1970), "Fear: The Potential of an Appeal Neglected by Marketing," *Journal of Marketing*, 34 (January), 54-62.
- Russo, J. Edward, Richard Staelin, Catherine A. Nolan, Gary J. Russell, and Barbara L. Metcalf (1986), "Nutrition Information in the Supermarket," *Journal of Consumer Research*, 13 (June), 48-70.
- Scammon, Debra L. (1977), "Information Load and Consumers," *Journal of Consumer Research*, 4 (December), 148-155.
- Sproles, George, Loren V. Geistfeld, and Suzanne B. Badenhop (1978), "Information Inputs as Influences on Efficient Consumer Decision-Making," *Journal of Consumer Affairs*, 12 (Summer), 88-103.
- , Loren V. Geistfeld, and Suzanne B. Badenhop (1980), "Types and Amounts of Information Used by Efficient Consumers," *Journal of Consumer Affairs*, 14 (Summer), 37-48.
- Sternthal, Brian and C. Samuel Craig (1974), "Fear Appeals: Revisited and Revised," *Journal of Consumer Research*, 1 (December), 22-34.
- White House Conference on Food, Nutrition, and Health (1970), *Final Report*, Washington, DC: Government Printing Office.