SOME VARIABLES AFFECTING BELIEF IN A PRO-FOOD ADDITIVE MESSAGE

by

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Abstract

Several surveys document the misinformation that exists among consumers about the use and safety of food additives. It is in the interests of a well-informed consumer that food scientists attempt to explain controversial food issues in an understandable manner. The objective is for consumers to have the information available in order to make informed choices in the marketplace.

Questions have been raised as to the acceptance of information designed to counteract the misinformation. The problem is that much of this counter-misinformation is directly opposite to the current negative societal sterotype about food additives.

This research examined the role of the traditional attitude change variable source crediblity, as well as receiver attitude towards food additives , as factors influencing belief in a pro-food additive message.

An attribute - treatment - interaction (ATI) model was used for the design of the study and results evaluated by linear multiple regression analysis.

A questionnaire consisting of a measure of attitude; a measure of belief in food additive statements; a pro-food additive message and a measure of belief in the message was developed. The message was attributed to one of three sources that had been previously rated as credible regarding information about food additives. For the control, the message was attributed to no particular source.

Results indicated that none of the sources were able to produce strong belief in the pro-food additive message. The attitude; the belief in statements and the sources accounted for 49.23 % of the variance in belief in the message. An interaction effect between source and attitude was found to be statistically siginificant.

Based on this limited study, it appeared that, for the population tested, the nutritionist had the same effect on belief in the message, regardless of the attitude of the receiver of the message. For receivers who held anti-food additive attitudes, the nutritionist was most effective at influencing belief in the message.

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I. <u>INTRODUCTION</u>

It is well documented that confusion and misinformation exist about the use and safety of food additives. Surveys show that some members of the public hold beliefs about food additives that are unsupported by scientific evidence (Anderson and Standal,1975; Boocock,1978; Duffek,1978; Knox and Schreiber, 1980; Martinsen and McCullough,1977; Zibrik et al, 1980). Some of these beliefs are:

1) Commonly used food additives present a health hazard (Knox and Schreiber, 1980).

2) Food additives are ubiquitous to all foods (Knox and Schreiber, 1980).

3) Additives are used for company profit at consumer expense (Knox and Schreiber,1980).

4) Controls on food additives are inadequate (Zibrik et al.,1980).

5) Processed foods (ie. food additives) are responsible for degenerative diseases (Broad,1979).

6) Food additives are unnecessary (Knox and Schreiber, 1980).

7) Food additives make food less safe.(Zibrik et al., 1980)

Several theories have been proposed to exlain why these misconceptions exist. They may be part of a food fad, where

certain foods are eliminated from the diet due to belief that harmful constituents are present (Bruch, 1973). Other reasons include sociological 'back-to -nature' trends (Clydesdale,1980; Saegert and Saegert,1976); the emotional aspects of food consumption (Clydesdale,1980); individual psychological background equating security with purity (Bruch, 1973); a perponderance of misinformation due to sensationalism in the press (Harper,1979; Sloan,1981; Young and Stitt, 1981);a lack of reliable information due to the experts not communicating (Harper,1979; Stillings, 1980);as well as political and educational problems (Clydesdale, 1980, Francis, 1979).

Some information on food-related issues could be detriment-al to health, such as the promotion of liquid protein diets that caused deaths due to lack of nutrients (Van Itallie, 1978). However, most of the unfounded food beliefs mentioned above do not affect the consumer this way. Instead, the problem manifests itself as a lack of sound information on which to make choices in the marketplace (Duffek,1978).

Advertisements that promote "natural" or "additive-free" foods take advantage of consumer concerns and ignorance.

"Unfortunately, consumer perception is not always consistent with reality and fact. For example, consumers perceive 'natural' ingredients to be more healthful and free from hazards than 'artificial' ingredients. Scientifically, we know that this is not the case. Rather than standing firm on the facts however, industry often perpetuates unfounded perceptions by flagging "all natural" ingredients in advertising" (p64, Stilling, 1980).

A 1978 survey of Vancouver Health food users found that

most of those shoppers surveyed were least able of afford the specialty foods (Duffek,1978). Another survey showed that these health food products were 30 % to 100% higher in cost than the same foods in a regular grocery store (Annon., 1973). Additional surveys indicate that consumers are very interested in obtaining more information about food additives (Knox and Schreiber,1980; Boocock, 1978; Zibrick et al, 1981). However, it is this very lack of information that renders consumers susceptible to misinformation due to difficulties in assessing the reliability of incoming information (Hall,1977; Clydesdale, 1980; Harper, 1979).

Clydesdale (1980) suggests that when value judgements are made about food, the wariness that ensues is due to emotions and lack of understanding, not wariness based on the capabilities of making sound judgements based on appropriate information.

Therefore, it is in the interests of a well-informed consumer that the scientific community, particularly food scientists attempt to explain controversial food issues in an understandable manner. A question arises however, as to the acceptance of the reliable information, designed to counteract the misinformation. How will the public accept information that is in opposition to the current societal stereotype : "Food additives are bad". ?

Attempts to overcome food-related misinformation suggest that there may be an inability of some members of the public to accept reliable information due to ingrained food beliefs. (Anderson and Standal,1976). This is supported by Saegert and

Saegert (1976), who felt that some people may be so tuned into food fad claims that they may be highly resistant to any educational effort that is perceived to originate from the establishment. Sims (1976) found that there appeared to be a great deal of influence on consumer attitudes from private sources of information that represented unreputable information. Based on this, Saegert and Saegert (1976) suggest that the issue of effective consumer education would appear to be related to the traditional attitude change variable of source credibility.

I. THE GENERAL PROBLEM

The general purpose of this study was to shed some light on how to communicate to the public a message which was contrary to popular beliefs. Societal stereotypes tend to be resistant to change and, consequently, any attempt to counteract the stereotype through verbal communication must consider problems such as those which follow.

II. SPECIFIC PROBLEMS

The specific problems addressed by this study concern the acccceptance of a message designed to counteract the misinformation about food additives with reliable information from experts in this field. Among many food topics, the food additive issue was chosen because of the documented problem that exists regarding consumer perspectives on food additives; the demonstrated need for reliable information; the unknown effect of an expert disseminating information that is contrary to what many consumers believe; and interest on the part of the

researcher in meeting the need for reliable information.

Several questions were raised as to the effectiveness of a knowledgeable professional providing information that was counter to the general beliefs and attitudes among consumers.

1) Who are the most credible sources of information on food additives ?

It would be of interest to know what sources are perceived to be the most credible so that they may be utilized for dissemination of reliable information.

2) Does the source of reliable information influence belief in a pro-food additive message ?

Research results say yes. According to Hovland (1953), Osgood et al. (1957), McCroskey and Young (1981), McGuire (1969), Hass (1980), Fishbein and Ajzen (1981), and others, the perceived competence and character of the message source will influence the belief in or acceptance of a message. It is not yet known if the source is significant in terms of a pro-food additive message. Perhaps the viewpoint of the message itself is a more important factor when the issue being addressed lies in a sensitive area and when there is a rather strong popular belief about the issue.

3) Does a person's initial attitude toward food additives influence their belief in a pro-food additive message?

The discrepancy of the message viewpoint from that of the receiver has been shown to influence the believability of the message. In addition, message discrepancy will influence the

effect of source credibility (an interaction effect) (Hass, 1981). It was considered useful to determine what the effect is with a pro-food additive message attributed to highly credible sources.

III. DEFINTIONS

A number of terms have been used in this study that are characteristic of the field of social psychology and communications. For clarification, they are defined here.

I. SOURCE CREDIBILTY

For the purpose of this study, source credibility is defined as the attitude toward a source of a communication held at a given time by a receiver (Tubbs and Moss, 1980). This attitude has two dimensions: the perceived competence and the perceived character of the source held by the reciever of the communication (McCroskey and Young, 1980). A source is highly credible when perceived to be highly competent and to possess a good character.

II. ATTITUDE

Attitude is a learned predispostion to respond in a consistently favourable or unfavourable manner with respect to a given object. The three basic features of attitude are a) that it is learned, b) that it predisposes action and thereby acts as an underlying guide to influencing behavior, and c) it has an underlying evaluative dimension requiring favourable or unfavourable judgement. (Fishbein and Ajzen, 1981)

III. <u>BELIEF</u>

Beliefs represent the information a person has about an object. Belief links an object, such as a person, group or institution or policy or event to an attribute, such as an object, trait, property, quality, or characteristic outcome. People differ in the strength of their beliefs, that is, in the perceived liklihood that the object is associated with the attribute in question. Thus, the underlying dimension of belief is a probability dimension, rather than an evaluative or judgemental one (Fishbein and Azjen, 1975).

IV. <u>DIMENSION</u>

The dimension of a construct is a latent trait or attribute assumed to underly the construct. For example, an evaluative dimension is assumed to underlie attitude toward an object.

V. <u>CONSTRUCT</u>

A contsruct is a defineable idea or phenomena. For example, source credibility is a construct.

VI. <u>CONNOTATIVE/DENOTATIVE</u>

A statement is said to be connotative if it elicits an affective response , such as 'evaluation', in attitude measurement. A denotative statement is a factual statement. In measuring attitude it is important that the belief statements used for this purpose are not denotative. Instead, the statements should elicit a favourable or unfavourable evaluative response toward the attitude object in the statement. Also, the

adjective pairs used in the measurement scales should be connotative rather than denotative.

IV. <u>RESEARCH</u> <u>HYPOTHESES</u>

Based on the specific problems, the following research hypothesis were investigated. Corresponding statistical hypotheses were formulated and analyzed in Chapter 4, Results.

1) If the subjects receive a reliable pro-food additive message from a credible source, then belief in the message will be influenced to a significant degree by the message source.

2) If a subject receives a pro-food additive message, then, belief in the message will depend to a significant degree on the subject's initial attitude toward food additives.

3) If a subject receives a pro-food additive message, then belief in the message will depend to a signifigant degree on the interaction between the subject's initial attitude and the source of the message.

V. METHOD OF STUDY

I. POPULATION

The target population of any reliable information would be the "average" consumer who makes food choices in the market place.

II. THE SAMPLE

The sample population used in this study consisted of a readily accessible group of summer students enrolled in Education Psychology courses at the University of British Columbia. Most were teachers, with ages ranging from 25 to 45 (approximately). Because of their professions, this sample may be of higher than average education, and perhaps higher than average socio/economic background.

The sample used was a sample of convenience.

III. INSTRUMENTS USED

i. Presurvey 1

The first presurvey involved a questionaire to determine which of nine possible sources of information about food additives were perceived to be the most credible. The survey involved responses on six 7-point scales, anchored by bi-polar adjective pairs that measured credibility. (McCoskey and Young, 1980) The surveys were conducted with a random sampling of volunteer students within the Department of Food Science at UBC.

ii. Presurvey 2

The second presurvey determined what statements should be used in the attitude measure of the main survey. Twenty-two possible statements, generated from the literature and expert opinion, were assessed by respondents who indicated on a 7-point scale how strongly positive or how strongly negative the statement was felt to be. A random sampling of volunteer students within the Department of Food Science at The University of British Columbia completed the survey. On the basis of the scores, (highest and lowest six), a total of six statements were chosen on the basis of their extremeness of polarity (positve or negative) and the standard deviation of the scores.

Analysis of the measurement instrument was conducted via the LERTAP computer programme. The program generated both descriptive and inferential statistics for the purpose of determining the operating characteristics of the items (adjective pairs) and the overall test. Also calculated were the mean scores for belief and attitude , as well as individual scores.

iii. Main Survey

The main survey consisted of a booklet comprised of the attitude and belief measure, the pro-food additive message attributed to a source and a measure of belief in the message. The attitude and belief measure was made using the six food additive statements chosen from Presurvey Two, with three pro-food additives and three anti-food additives. Following each

statement was a set of 8 bi-polar adjective pairs , anchoring 7-point scales. The first four adjective pairs measured belief in the statement ,the covariate. These adjectives were: true-false, likely-unlikely, probable- improbable and impossible-possible. The last four adjective pairs measured attitude, the attribute variable, by responses to: wise-foolish, sick-healthy, good- bad, and harmful-benificial (Fishbein and Raven, 1967).

Then followed a pro-food additive message attributed to one of the three most credible sources as determined in Presurvey One, or to no source at all. There were therefore four groups of questionaires, each with the same message attributed to different sources. The questionaires were randomly distributed among the sample population.

VI. <u>ANALYSIS</u> <u>OF</u> <u>RESULTS</u>

Results were assessed using linear multiple regression analysis involving both continuous variables (belief in statements and attitude toward food additives) and categorical variables (treatments ie. the sources of the message). The UBC BMD:03R computer programme was used to analyze the data.

VII. <u>LIMITATIONS</u>

There may be some difficulty with generalization of the Presurvey One results to those of the Main Survey due to the fact that people with a food science baround completed the two presurveys, while education psychology students completed the main survey. In the preparation of the booklet and the verbal instructions there was no attempt made to hide the purpose of

the study. Because respondents knew the purpose of the survey, ie., that the effect of message source was being studied,their responses may have been biased, for example, to please the researcher.

A convenient sample was used and this makes extrapolation of the results to the general public, for whom this information would be useful, problematic. Time, financial constraints and availability of subjects for the study dictated this decision. Ideally there should be 30 or more subjects for each variable measured. With two treatment varibles (attitude and belief in statements), one dependent variable and four treatment variables, 7 x 30 = 210 subjects should have been utilized. Unfortunately, the sample size was 125, and so care should be taken in extrapolation of results.

In one of the classes some feedback was obtained regarding the survey. The association of some of the sources to the message was deemed unrealistic by some. ie., "a doctor would never say anything like this".

VIII. SAFEGUARDS

To minimize serious effects on the survey due to administration of the test, the researcher standardized the instructions and conditions as carefully as possible. For example, the same instructions were read verbally to each class. Care was also taken to reduce bias in the response. To illustrate, the bipolar adjectives on the scales were reversed so that all the favourable adjectives would not be down the left side of the page. This was done to discourage lazy responses

and to avoid what is sometimes referred to as 'space error'.(Fishbein and Raven, 1975)

The scales were previously assessed to be reliable (Fishbein and Raven, 1967). Standard errors and Hoyt Reliablity Coefficients obtained met the reliability criteria outlined by Nelson (1977). An attempt to ensure validity consisted of input by experts who evaluated the statements that were used in the measure, and the structure of the message.

II. LITERATURE REVIEW

I. BACKGROUND TO THE PROBLEM

It is widely supported in the literature that there is a concern among consumers about the safety and adequacy of the food supply,and in particular, the safety of food additives despite a lack of suppoting scientific evidence for the concern (Annon., 1973; Bates,1981; Bruch,1970; Duffek,1978; Hall,1973; Hopper,1977; Boocock, 1978; Stillings,1980; Trenholm, 1980; Zibrick,1981; Knox and Schreiber, 1980).

These concerns have lead to the avoidance of processed foods and additives by some consumers and to the use of "health foods", "organic foods" and "natural foods" . It is possible that these tendencies are a "food fad", defined as" favored or popular pursuits or fashions in food consumption, prevailing for a period of time " (Bruch, 1970).

There are three basic types of food fads:

1) those where special virtues of a particular food are exaggerated and are purported to cure specific diseases;

2) those where certain foods are eliminated from the diet due to the belief that harmful elements are present;

3) those where the emphasis is placed on" natural" foods.

Concerns about food additives that lead to their elimination from the diet could be categorized as a type 2) fad: avoidance of foods believed to contain harmful elements. This could quite possibly lead to type 3) fad, the use of "natural" foods.

As listed in Chapter 1, (page 1), there are many specific misconceptions about food additives that help support the "fad". Reasons for the misconceptions can be classified into the following categories:

1) sociological

2) emotional

3) psychological

4) popularity of misinformation

5) lack of reliable information

6) educational

7) political/governmental

I. SOCIOLOGICAL

Clydesdale suggests a sociological explanation for the misconceptions about food additive safety. A fast-paced world, bewildering and frustrating lifestyles coupled with a mistrust of big business has led to a desire for a simpler, slower moving, honest and basic lifestyle (Hall,1977; Clydesdale,1980) . Since food companies represent big business and and food additives a modern production system that is all part of a complicated and confusing modern lifestyle, food additives are rejected. Hall (1977) refers to the complexity and materialism

of modern society. Hopper (1977) states that a lack of understanding of a complex scientific world has caused a backward step in understanding. Young and Stitt (1981) say that the back to nature trend is a step to counteract the problems of civilization. Several authors make reference to the ritual cult or religious aspects of adherence to alternative diets, such as Zen Macrobiotic, that exclude processed foods and food additives (Bates, 1981; Bitenstky, 1973; Annon.,1973).

Another aspect of sociological causes of concerns about food is that in times of food affluence (as the present), there is no need to worry about starvation. The worry about food, part of the basic human survival instinct, has now shifted to the safety and adequacy of food (Bates, 1981) and to the specific benifits from particular foods (Clydesdale, 1980).

II. EMOTIONAL

Clydesdale (1980), explains that the emotional aspects of food consumption, particularly the intimacy involved, causes good or bad values to be placed on the food itself. Indeed, the sense of well-being associated with eating the "right" kind of food causes that food to become a pacifier, a giver of contentment and repose (Boocock, 1978; Bruch, 1970). In addition, eating is much more than a matter of appeasing hunger. The cultural, moral, and social involvement that dictates what we eat, when we eat, how we eat, and with whom we eat makes food consumption itself very emotional (Bruch, 1970; Hall, 1977; Clydesdale, 1980).

III. PSYCHOLOGICAL

The psychology of the problems of misocnceptions about food
is dealt with by several authors. Bruch (1970), suggests that

"....if early personal experiences are unwholesome, instead of
developing a basic trust, an individual becomes deeply
mistrusting; views life situations as threatening; some develop
rigid personalities and repress the impulse to experience
satisfaction; discharges repressed hostility at a convenient
cultural scapegoat. For these people, security is equal to
purity and health is equal to naturalness. Food additives are
perceived to represent adulterated, synthetic food - something
to be avoided. This person is concerned with pure food, pure
morals, and pure races. He sees safety in the old and familiar,
while the new and unfamiliar (like food additives) is viewed
with suspicion and apprehension as threatening." (p.318).

It is unlikely that the vast majority of consumers will
fall into this category. However, those that do help to
perpetuate the misinformation. There are several other
situations in which psychology plays a role in misconceptions
about food:

1) There is a psychological need for the
chronically ill to solve health problems
that are unsolveable by traditional
medicine. The need for hope is met by
particular diet or supplement regimes.
These food fad adherents have been
reffered to as 'miracle-seekers', with
uncritical beliefs in bizarre and
unrealistic promises. (Bruch, 1970;
Annon., 1973).

2) Some people are afraid and anxious

regarding the uncertainties and threats of living and become overconcerned about their health (Bruch, 1970).

3) Susceptability to food fadism has been shown to be associated with bizarre or extremist personality traits resulting in irrational behaviour.People use a product in the absence of clear-cut harmful properties,"'just to be sure" (McBean and Speckman, 1974).

4) Additional psychological descriptors include paranoics or extremists with a desperate mistrust of the medical profession, truth-seekers, fashion followers, super-health pursuants, and ritual or authority-seekers (Bruch, 1970; Annon., 1973).

5) These descriptors are very generalized over a wide range of food behaviours. In a study to determine the variables associated wth the consumption of food fad products,vitamin E users were found not to be more neurotically anxious or socially abraisive and had no more antiestablishment views than non-users of vitamin E. They were, however, less ego-organized and more extroverted and

relatively more unstable and impractical,
which suggests susceptibility to
unsupported claims made for fad health
products (Saegert & Saegert, 1976).

6) In another study, psychotism and
neuroticism of college students was
compared to their food choices and no
correlation was found (Lester, 1979).

IV. MISINFORMATION

Misinformation, whether intentional (for econimic gain via promotion of a book or produt) or unintentional (by misguided, but well-intentioned individuals or groups) is popular because the rational scientific approach fails to fulfil the desireable needs of suffering people who want to be made better by their food (Francis, 1979).

In addition, the field of food and nutrition is particularly open to quacks and cultists who fill this emotional gap for hope that traditional health and food education neglects (Francis, 1979; Stillings, 1980; Bruch, 1970). Unfortunately, the public does not posess the skills and knowledge required to differentiate between fact and fallacy (Annon., 1973). Freedom of the press means that information, regardless of its scientific veracity can be published.

The British Columbia Nutrition Council (1978) lists the following criteria for considering particular food and nutrition books to be unreliable:

1) the focus is on magical and curative powers of a specific nutrient or food or the avoidance of such; and the claims are exaggerated often to promote a special product. At times the reccommendations are dangerous to health;

2) quotes from nutrition experts or research results are often distorted and used out of context to suit the author's purpose;

3) nutritional recommendations are often based on anecdotal expriences or personal hunches and therefore lack the objectivity of scientific research;

4) overall corruption of the scientific and medical establishment is suggested and exagerated fear tactics are sometimes used to arouse fear of normal food.

Similar problems are encountered with the popular information on food additives. In the media (newspapers, magazines, radio, television), a tendancy to polarize issues into black and white, good and bad, has led to a sensationalized picture of food additives.

The reporter may have difficulty in assessing the scientific aspects of the research, or, have a particular bias or point of view to convey. Clydesdale (1980) states that there is a tendancy to distort both the advantages and limitations of science to accomplish or prove a point of view. This leads to

distortion of the actual facts and information (Clydesdale, 1980). The media has been accused of misleading reporting, (Leveille, 1980) and sensationalizing food issues (Harper, 1979; Hall, 1973; Sloan,1981). An example, outlined by Sloan (1981) revealed an incident in which the results of an experiment demonstrated only that 10- 20% of carbohydrate in wheat flour was not absorbed. This was distorted to such headlines as "Study Shows White Flour is Digestive Villain ".

Hall (1973) says that the media emphasizes bad news since it sells much better than good news . Hence the image of food that is the outcome of the reporting on food issues is a bad one. Marshall (1979), explains further that reporters tend to search out opposite poles of opinion and then balance one extreme against the other to create an artificial form of objectivity. But, the middle ground is left ignored. He goes on to say that also, there is an inability of newspapers to understand the subtlties of scientific debate.

V. LACK OF RELIABLE INFORMATION

The lack of reliable information available to consumers is due to several reasons. Food companies, the users of food additives, do relatively little to educate consumers about food ingredients. What information that does come across often spills over from promotional activities and therefore lacks credibility (Hall, 1973).

In addition, the more recent trend of the industry to jump on the "all natural" bandwagon does little to instill confidence in the original products (Hall,1973; Stillings,1980; Hopper,

1977; Clydesdale, 1980).

Another problem that reduces the amount of reliable information is that professionals are often poor communicators, despite the fact that they are perceived to be highly credible (Hall, 1973; Hopper, 1977; Annon.,1973; Omnibus surveys, 1981...check) There is a need for ethical, disciplined scienists who don't jump the gun on releasing results to the media and are prepared to explain the significance of their work (Hall, 1973).

It is unfortunate that all the answers to some of the food issues are not available. This makes it difficult to give one absolute unequivocal answer (Clydesdale, 1980; Celender & Sloan, 1977). Issues are left open for self-appointed advisors to provide easy answers. The relationship between diet and chronic degenerative diseases is particularly vulnerable to this sort of thing (Leveille,1981).

VI. <u>EDUCATIONAL</u>

There is a difficulty in the educational process itself that has lead to misunderstandings about food issues. Technical issues are often so complex that educational efforts have lagged behind, particularly in the area of risk associated with food consumption (Francis, 1979). Increased industrialization and technology make it difficult for consumers to use their own judgement regarding the utility and safety of food (Celender & Sloan, 1977; Hall, 1977). Another author states that the hostility index felt by consumers toward processed foods is directly correlated with the degree of ignorance regarding food, though this has yet to be shown (Boocock, 1978). Hopper (1977)

agrees that a lack of knowledge, plus misinformation have lead to an erroding confidence in the food supply. There is an ignorance of food composition (Clydesdale, 1980), that has lead to a "chemophobia" paranoia about any chemical- sounding ingredients (Francis, 1979).

Several authors agree that there is a general lack of understanding of the process of scientific enquirey (Harper, 1977; Marshall, 1979; Clydesdale, 1981). The unrealistic expectation is placed on science and technology to explain occurrances in all circumstances that which is researched only in particular given circumstances. This results in extrapolation of results to a general, all-encompassing situation, when the results apply to one situation only.

VII. POLITICAL/GOVERNMENTAL

Politics and the government can be blamed for part of the problem of food misinformation. Several governmental agenicies are involved with food additives, particularly the Health Protection Branch (HPB) of Health and Welfare Canada and Consumer and Corporate Affairs (CCA). The HPB governs the use of food additives and safety evaluation. This protection has been interpreted by the public to mean that there is no risk associated with food consumption. Francis (1979) states that it is a shock for the public to learn that there is no absolute safety concerning food. This causes a backlash of avoiding foods thought to be "risky", when they are found not to be 100% beyond a doubt safe. Yet, in the world, nothing is absolutely, safe. Even natural hazards, such as toxins from bacteria or

mould, can be of more significant risk to health than additives
(Hall, 1973, 1977).

The banning of a food additive causes many repercussions.
Eroding confidence in governments who appear derelict in their
duty to protect; a food industry callus in their responsibility
to produce safe products; and consumer exposure to needless
hazard while the additive is tested, are all side effects of
banning a food additive once considered safe (Hopper, 1977). In
actual fact, however, delisting of a food additive is a response
to an increase in world body of knowledge, improved measurement
techniques and an expert assessment of the risks vs the benifit
of use. In other words, the file is not closed once an additive
is approved - science marches on seeking further knowledge.

Legislative decisions to ban a food additive may be taken
as representing factual risks, when they represent only
concensus and compromise that uses the scientific information,
but, not scientific method (Leveille, 1980).

In summary, the problem of misinformation and food fads is
well documented. The question remains as to how to correct the
situation.

II. SOURCE CREDIBILITY

The idea that the source of a message could influence the
extent to which a receiver believed what the message advocated
has existed since the time of Aristotle. Aristotle viewed
ethos, another name for source credibility, as one of the most
potent means of persuasion (McCroskey and Young, 1981).

In the past sixty years, source credibility, also called

ethos, prestige, charisma or image (Berlo et al., 1970), has
been studied extensively by researchers in the fields of
communication, social psychology and psychology of attitudes.
The following literature review will attempt to cover those
aspects of the research that define the concept of source
credibility and those studies that help to illuminate the
specific role of source in desseminating reliable information
about food issues.

Source credibility is defined as the attitude toward a
source of a communication held at a given time by a receiver,
(McCroskey, 1972). Other researchers offer variations of this
definition that say essentially the same thing (Tubbs and
Moss,1980; Hass, 1981).

McCroskey emphasizes that source credibility is but a
subset of all which is perceivable. Its distinct definition: an
attitude of a receiver towards a source , distinguises source
credibility from other perceptions that people have of each
other.

Differences in the effectiveness of a source depend on the
attitude of the receiver towards the source. This attitude is
based on:

1) feelings of affection and admiration that
   illicit a desire to be like the source;

2) feelings of awe and fear about the source;

3) feelings of trust regarding the knowledge and
   sincerity of the source (Hovland et al.,
   1953).

These feelings have been labeled as attractiveness, power and credibility (Hass, 1981). In communication research much attention has focused on the credibility factor. This is perhaps due to the relative ease, in a brief laboratory setting, of producing measureable changes in the factual beliefs of the message recipients. It is far more difficult to change receiver's values which would result from variations in the attraction dimension (Hass, 1981). The power component is probably not an everyday occurrance, but would be of interest with respect to propoganda campaigns that attempt change via threats. Also, the emphasis on credibility may have grown out of the traditional use of informational type communications in attitude research (Hass, 1981). Historically, this construct involves:

1) a source's knowledge of the subject

2) his or her veracity

3) his or her attitude toward the well-being

    of the receiver (McCroskey, 1972).

It is important to note that these are the perceptions of the receiver of the message, regarding the source. In other words, source credibility is the degree to which a receiver believes the source to know the correct position, and, the extent to which the source is motivated to communicate that position without bias (Hass, 1981).

Aristotle called the above three dimensions of source credibility intelligence, character and good will (McCroskey and Young, 1981). These dimensions are very similar to the

expertness, trustworthiness and intention dimensions proposed by researchers 2000 years later (Hovland et al., 1953). These dimensions are the aspects of the source that the receiver evaluates in order to assess the credibility of the source of information.

Since the method of factor analysis became popular in the sixties, many new dimensions of source credibility emerged. Factor analysis is used to determine which criteria listeners use as the basis of their judgement of source credibility. More specifically, it is one method of examining a correlation or covariance matrix. The procedure searches for groups of variables that are significantly correlated with each other and not highly correlated with other groups of variables. These groups of variables are called "factors" or "dimensions". The degree to which a given variable is associated with a particular factor is estimated by its "factor loading", a type of corrleation between how well the variable fits that factor (McCroskey and Young, 1979).

Some of these so-called 'new dimensions' include:

a) safety, qualification and dynamism (Berlo et al., 1970);

b) authoritativeness and character (McCroskey, 1966);

c) orientation and charisma (Tuppen, 1974);

d) competence, character, sociability, extroversion, composure (McCroskey, 1981);

In his recent review, McCroskey (1981) states:

"We believe the current confusion is a distortion of the source credibility construct which occured in the early 1960's and has been perpetuated to the present " (p. 27, McCroskey, 1981).

He concluded that if the construct of source credibility is not clearly defined and the researcher does not stick to that construct definition, it is quite possible to obtain other dimensions, besides the original three of expertise, intelligence and intention. Also, if scales are added to measure factors that have no resemblance to the originally defined construct, that construct itself is not changed.

Thirdly, McCroskey states that theoretically there are three dimensions of source credibility : competence, character and intention. Impirically however, these collapse to two: competence and character. The perception of the source's intention is dependant on the perception of the source's character (McCroskey, 1981).

In this section the following aspects of source credibility research will be examined:

1) <u>MAIN</u> <u>EFFECTS</u>

    The main influence of source credibility on the
effectiveness of the communication. The design has
been to select or create sources with different initial
levels of ethos, attribute an identical message to the
different sources for comparable audiences and to
measure the differences in the persuasive effect
(usually attitude change).

2) <u>INTERACTION</u> <u>EFFECTS</u>

   The interaction effects of source credibility with
   such other communication variables as the audience and
   the message.

3) <u>THEORETICAL</u> <u>EFFECTS</u>

   There are several attiude theories that explain the
   effect of source credibility on an individual basis.
   These theories include cognitive response theory,
   congruity theory, attribution theory, cognitive dissonance
   dissonance theory, least effort hypothesis and basic antim

I. <u>MAIN</u> <u>EFFECTS</u>

What is referred to as the "classic study" in the review
literature, was the first to examine the persuasive outcome of
an actual speech. Franklyn Haiman's thesis disertation in 1948
examined the effect of source credibility on changing audience
attitudes via taped speeches (McCroskey & Young, 1981;
McCroskey, 1972; Anderson and Clevenger; 1966; McGuire, 1969).
The results of this research showed that the Surgeon General of
the United States was more effective at changing audience
attitudes than the Secretary for the Communist Party in America
or a Northwestern University Sophomore, even though all three
gave the same speech (McCroskey, 1972). There had been earlier
studies in the 1930's, but these only linked a source with a
proposition; there was no actual speech (Anderson and Clevenger,
1963).

From the Haiman study a number of similar studies followed,

but the next main input came from the work of Carl Hovland and colleagues at Yale University (Anderson and Clevenger, 1963). These results have been summarized into the following conclusions:

1) reactions to a communication are significantly affected by cues as to the communicator's expertness, trustworthiness and intentions;

2) identical presentations are judged more favorably when attributed to a high credibility source;

3) in two of the three studies, immediate acceptance of the recommended opinion was greater when attributed to a high credibility source (Hovland et al.,1953).

The authors note that even untrustworthy sources produced changes in the favoured direction, except that this change was much less than the high credibility source and was due only to arguments in the message (Hovland et al., 1953).

It is also of interest to note that the Hovland studies showed that the source credibility had no effect on learning of the content of the message (Hovland et al., 1953).

Hovland et al. (1953) pointed out that high source credibility was was effective:

a) for immediate opinion change;

b) where a close association between source and recipient was made;

c) when a formal or informal commitment had

    been made.

Otherwise, the effect of source is

diminished over time.

In their 1963 review, Anderson and Clevenger state:

"The finding is almost universal that the ethos of the source is related in some way to the impact of the message" (p. 77, Anderson and Clevenger, 1963).

In most cases a high credibilty source will increase the acceptance of a message. However, there are some circumstances where this is not the case.

In general, the main effects of source credibility can be summarized by saying that high credibility sources are more persuasive than low credibility sources, with some exceptions. These exceptions are due to interaction effects.

II. INTERACTION EFFECTS

Other variables, such as the characteristics of the audience and of the message have been shown to modify the effect of the credibility of the source on the effectiveness of the message.

a. <u>AUDIENCE</u> <u>VARIABLES</u>

i. <u>Psychological</u> <u>Characteristics</u>

Extensive psychological testing by Plax and Rosenfeld (1980), lead these researchers to conclude that high credibility sources lead to high attitude change for poeple characterized as being: changeable and socially ascendent, liberal in decision making, capable and responsible, intelligent, felt inadequate and unworthy, had unstructered thinking, submissive and compliant before authority, changeable with a tendancy to internal conflicts, and unsure in new or unfamiliar social settings. The reverse was true for people wth low attitude change from the high credibility source.

The low credibilty source lead to high attitude change for people who wére assured of their reasoning abilities, cooperative and stable, had common sense and good judgement, were insightful and versatile, changeable but confident, little emotional involvement with sensitive issues and were careful and cautious.

Low attitude change with a low credibilty source was characterized by people who were capable, but independent, committed to sensitive issues, conservative and conventional. The authors state that it is individual differences that order the response to high and low credibility messages (Plax and Rosenfeld, 1980).

When the audience is highly authoritarian, involved or has a high internal locus of control, a high crediblity source is

equal to the effectiveness of a low credibility source (Dholakia and Sternthal, 1977).

When the audience is self-assured, confident and objective, a low credibility source can cause more significant attitude change than the high credibility source (Plax and Rosenfeld, 1980).

Persons with an external locus of control perceive reinforcements to be beyond their control and attributable to chance, fate or powerful others. Hence a highly credible source is more likely to be a reinforcement than a low crediblity source and therefore more persuasive. However, a persons with an internal locus of control must justify their behavior themselves and so are not as influenced by others and source credibilty will have no effect (Sternthal et al., 1978b).

Highly authoritarian people are strongly influenced by the dominant cue in a communication. Therefore, where there are no arguments to support an advocacy, when arguments are brief or when the message is complex, the source becomes the dominant cue and source credibility will have an effect. Low authoritarians, however, rely on multiple cues and source credibility is used only when they have little detailed knowledge of the topic, such as in the case of a cultural truism, but, not when they know something (Sternthal et al., 1978b).

A neutral intitial opinion made receivers more susceptible to source credibility as opposed to those who were pro or con (Anderson and Clevenger, 1963).

Audience variables depend on message content for their

effectiveness. For example, a receiver low in self esteem will, in comparison to a high self esteem individual, yield more to forcefully stated arguments. Whereas, the reverse might be true in the case of arguments stated in a qualified manner. For other arguments there may be little or no difference between high or low self esteem receivers (Fishbein & Azjen, 1981).

In addition,there can be more than one interpretation of the effects of an individual difference variable. For example,receivers high in self esteem should have more confidence in the validity of their own beliefs than low self esteem receivers. Hence they would be expected to be less swayed by arguments contained in a message . Or, one could say high self esteem individuals would find it easier to admit they were wrong and accept the communicator's position than would individuals low in self esteem. ·Conflicting hypothesis could be derived for such other audience variables as intelligence, locus of control, authoritarianism, religosity or sex of the receiver (Fishbein and Azjen, 1981).

ii. Other Audience Characteristics

In their summary of variables, that might affect the influence of source credibility, Anderson and Clevenger (1963) stated:

1) personality was not related to susceptibility to source credibility;

2) intelligence and knowledge of the topic were not related (three studies), while one study showed the more intelligence

the less susceptible;

3) sex was not related to susceptibility to source credibility (three studies), though one study showed females to be more susceptible and another showed girls to be more susceptible;

4) students were more susceptible than adults;

When a person takes some behavioral action in response to an advocacy, this behavior serves as the persuasive cue. (I signed the petition therefore I must have a favorable attitude towards it.) In this case, a low credibiltiy source is more persuasive, both for those who sign the petition and for those who do not. But, the person must be aware of the reasons for his behavior and the behavior request must be voluntary (Sternthal et al., 1987b).

When invlolvement in an issue is low, high credibility sources are more persuasive, ie. increasing involvement reduced the effect of a highly credible source (Sternthal et al., 1978b).

The initial opinion of the recipient can influence the effect of source credibilty. When an audience is favorably predisposed to an advocacy, a low credibility source induces greater persuasion, while if extremely negatively predisposed, a high credibility source will be more influential. Initial opinion may be confounded with involvement as one study found people with extreme opinions also exhibited greater involvement

(Sternthal et al., 1978b).

Source/recipient similarity can influence source crediblity according to Hass (1981). A source will have a greater influence if he is pereived to be similar to the recipient. This similarity bridges the gap between source credibility and source attractiveness, making the source seem more credibile or more attractive (Hass, 1981). If similarities are relevant to the message topic, persuasion is increased due to an influence on credibility.

The attitude of the receiver, compared to that of the message source can influence belief in a message. Hass (1981) summarized the research on source/recipient descrepancy. Studies show that where the audience-receiver attitude is in opposition to the position recommended in the message, a) a high credibility source is more effective than a low credibility source; b) the more attitude change advocated by the source, the more change evoked, up to a drop off point; and c) this drop off point occurs at a more extreme source/recipient discrepency for a high credibility source than for a low credibility source (Hass, 1981).

When the message is incongruent with the source's best interest, or where a source justifies his position with arguments that are unfamiliar to the message recipient, a low credibility source is as effective as a high credibility source (Hass, 1981).

b.   <u>MESSAGE</u> <u>VARIABLES</u>

Various aspects of the message itself act both in their own right and along with audience and source variables to influence the effectiveness of the message.   The use of arguments and evidence, as well as style are characteristics of the message itself which can, on their own, act to influence the effectiveness of the message. The descrepancy of the arguments in the message to the receiver's point of view influence the acceptance of the message. The incongruity of the arguments presented in the message with the source's best interests will also influence the acceptance of the message.

iii.   <u>Arguments</u> <u>in</u> <u>the</u> <u>message</u>

Message variables distinguish the limiting conditions under which the high credibility source causes more opinion change than the low credibility source:

1) when the message does not stand on its own, ie, poor arguments and assertions;

2) when the high credibility source gives a message that would otherwise be strongly rejected on its own merit, due to a tendancy to dissociate the source and the message content (Hovland et al., 1953).

If a message is structured to disarm a recipient's counterarguments early in the message and avoids suggesting new counterarguments, the message is likey to be more persuasive when the high credibilty source is used (Hass, 1981) .

There has been much debate regarding the effect of presenting just one side of the argument versus both sides. In 1963, a review published mixed results:

1. a 1-sided message was more effective if the audience favoured the advocated view, and had no high school education;

2. a 2-sided message was more effective if the evidence used supported one side only, for audience with high school education;

3. a 2-sided message produced no significant difference in attitude change than a 1-sided message (Anderson and Clevenger, 1963).

Two-sided appeals are partially congruous, as arguments both favourable and unfavourable to the speaker are presented. In this situation, two-sided appeals in themselves are more persuasive than one-sided, provided the unfavourable side is presented first, is refuted in a compelling manner and cites only unfavourable arguments already known to the audience.

Rephrasing this, the high credibility source will enhance the source's influence when the information presented in the message is compelling, congruous wth the source's best interest and when the source is characterized as a person who has maintained his or her position over time. There is no systematic credibilty effect expected , however, when the

communicator is partially congruous or is a convert. A low credibility source can increase his persuasiveness by assuming an incongruous position.

It is better to ignore opposition arguments if the audience is favourable to the advocacy and of low intelligence. However, one should refute oppostion arguments if the audience is unfavourable and of high intelligence (McGuire, 1969).

There are ambiguous results regarding :

1. whether the stongest arguments should go at the beginning or end of the message;

2. whether opposition arguments should be refuted before or after support arguments. (McGuire, 1969)

iv. <u>Message</u> <u>Style</u>

The message style refers to language, tone and sentiment expressed. There are ambiguous results regarding the use of humour and and whether the appeal should be emotional or rational (McGuire, 1969).

Other factors investigated at that time found that the use of authority in quotes did not increase persuasion. (Anderson and Clevenger, 1963).

Reinforcements within the message, such as praise for accepting the advocated attitude and/or support arguments for the advocacy increase the amount of attitude change (McGuire, 1969).

Regarding message style, the use of metaphor was found to

be effective at increasing the amount of attitude change, due to its effect on evaluation of the source who is then seen as more intelligent or as entertaining and pleasing (McGuire, 1969).

It is better to include the conclusion in the message , as this ensures that the receiver gets the point ,it makes the source seem more sure of himself and if it is a desireable conclusion, it can increase the motivation of the receiver to agreee. This does however, interact with individual differences (McGuire, 1969).

There is some ambiguity as to the whether the conclusion, if included should be placed first or last. If first, it may alienate those receivers who were opposed to the advocacy and it may show the source to be biased, with intention to persuade. But, the advantages of placing the conclusion first include an increase in comprehension, a focus of attention, and defining of a clear position and focus of the message. The latter leads to a feeling of closure satisfaction and less anxiety regarding a missed point. There is interaction with message complexity , intelligence and issue familiarity (McGuire, 1969).

Agreeable information should be placed first and then the disagreeable, for optimum attitude change (McGuire, 1969).

v. Use of Evidence in the Message

Investigations were also made into the amount of evidence and documentation used in the message (Anderson and Clevenger,1963). If the argument was supported, but without documentation or if it was supported with documents and the source was called an expert, a greater shift in opinion resulted

than with a non-expert source. When just the support and documentation were made, the effect was no greater than with a generalization, that is, no evidence or documentation (Anderson and Clevenger, 1963).

Use of supportive factual information from a source other than the speaker inceased the persuasiveness of a low credibility source only, provided the evidence was unfamiliar to the audience. No credibility main effect was found when unfamiliar evidence was used as in an attack on a cultural truism, an issue that most people have accepted as being true, but, for which they have little supporting evidence. A low credibilty source can increase their persuasiveness by using evidence to support their position (Sternthal et al., 1978b).

The message will be relatively ineffective if the evidence used is unrelated to the arguments and the arguments are unrelated to the primary beliefs underlying the dependant variable. Sternthal, Phillips and Dholakia, in their 1978 review of message factors suggest the following are of importance:

1) Discrepancy

2) Threat

3) Message Incongruity

4) Use of Evidence

vi. <u>Discrepancy</u>

Discrepancy refers to the difference between the receiver's point of view and the point of view expressed by the source in the message.

A highly credibile source is more influential than a low crediblity source when the message discrepancy is relatively high, but not extreme. There is less or no credibility effect when the message discrepancy is relatively low.

Selective exposure theories describe the tendancy for a person to a) seek out information that confirms his preconceptions and b) actively avoid information that disconfirms them. The latter point, b), has little support in the research, and, results for the former are also ambiguous (McGuire, 1969).

If the message is discrepant, there is a tendancy for the receiver to distort the information as being less fair, less logical, less interesting, etc. and also to distort the relative position of the advocacy on an attitude continuum. Research showed that if a message is only slightly discrepant, from the receiver's position, the receiver distorts it as being closer to their own position than it really is. This is called "assimilation error". "Contrast error" occurs when the message is very discrepant and the receiver distorts it as being even further away from their position than it really is (McGuire, 1969).

The greater amount of change urged in a message, the greater the obtained attitude change, up to a falling-off point.

A high credibility source will endure a greater discrepancy before the falling off point than a low crediblity source (McGuire, 1969).

The more involved a person is, ie committed to the correctness of their initial opinion, the smaller the impact of a highly descrepent message (McGuire, 1969). If a person has a neutral opinion, the high credibiltiy source causes the most opinion change when attributed to an opinionated message and a low credibility source is more effective with a non-opinionated message. If the person has a negative opinion to start, increasing the opinionatedness of the message decreases the persuasion for both the high and low credibility sources.

Source, message and audience factors may serve to facilitate, or inhibit acceptance of arguments contained in a message, and, they have a cumulative effect on the overall effectiveness of the message. Acceptance of a given argument increases with overall facilitaion and decreases with the discrepancy between the belief of the source and that of the receiver (Fishbein & Azjen, 1981).

This implies that facilitating factors such as source credibiltiy and receiver self-esteem will influence the acceptance of an argument primarily at high levels of discrepancy. Also, additional facilitating factors may do little to increase the acceptance of an argument if the overall facilitation in a message is high to start with.

vii. <u>Threat</u>

When physical or social consequences of non-compliance are included in a message, the greatest attitude shift was found when a high credibility source presented a strongly threatening message. In addition, in the social threat situation, a high credibiltiy source is more effective, whether the message is opinionated or not.

When fear appeals are used, there is a positive relationship between the intensity of the fear appeal and the amount of attitude change. This is not a simple relationship though, and depends on the receiver's level of anxiety and the specificity and efficacy of the urged solution. (McGuire, 1969).

viii. <u>Incongruity</u> <u>of</u> <u>Message</u>

If the message is incongruent with the source's best interests, or if the source justifies his position with arguments that are unfamiliar to the message recipients, a high credibilty source will be equal to a low credibilty source in the amount of attitude change evoked (Sternthal and Dholakia, 1977).

When information that is incongruous with the source's best interests is presented, a high credibility source is as influential as a low credibility source. But, a high credibility source was more persuasive than a low credibility source when the source made arguments that were congruent to their own self-interests. A source currently supporting a

position that is incongruent with their past, ie a convert, induces greater influence for their advocacy that the source who has always supported that position.

Research suggests that we tend to feel communicators who express views similar to our own are more credible than those who express contrary views (McCroskey, 1972) .

Similarities in background, experience and attitudes will help to increase the derived ethos if the audience is favourably disposed to these attributes. One study reviewed by McCroskey, (1972) suggests that such similarities do not have to be real to have an effect. Even if the source's advocacy does not turn out to be as initially stated, he will still have greater success at modifying attitudes than a source who makes no attempt to establish common ground.

If the message is incongruous with the source's best interest, or the source justifies his position with arguments that are unfamiliar to the message recipients, a high credbility source is equal to a low credibility source in the amount of attitude change evoked (Dholakia and Sternthal, 1977).

Conflicting findings in the literature regarding the optimum format of the message may be due to differences in discrepancy levels used in the study, the inherent presence of other facilitating factors, or ignorance of message content such as factual evidence, relevance of evidence to the major arguments and the relation of these arguments to the dependent target variable (ie belief in the message). According to Fishbein and Ajzen (1981), of the studies comparing various

types of persuasive appeals , (such as rational vs. emotional; high fear vs. low fear; 1-sided vs. 2-sided; conclusion vs. no conclusion; and order of arguments) none "...have been found to have consistent and replicable effects on the persuasiveness of the message" (p358).

In the studies, all message manipulations varied both in the kind and amount of information included, except for those studies on order of presentation. Variation in the type of appeal were confounded with differences in the content of the message.

Effectiveness of type of appeal therefore depends primarily on the content of the message employed in the study (Fishbein and Ajzen, 1981). The effects of source credibility on amount of change will also depend on the content of the message used. Variations in the source credibility had a significant effect on attitude change only when minimal evidence was provided. When the message contained strong supportive evidence, there was no source effect. Receivers change their primary beliefs on the basis of the supportive evidence, irrespective of the source's credibility. Research on attractiveness and power has produced even less consistent findings than research on source credibility, again due to message content (Fishbein and Azjen, 1981). When studying the discrepancy dimension, it is important to make the message as extreme as possible to ensure that the discrepancy dimension will capture the most extreme positions (Bochner and Insko, 1976)

According to Fishbein and Azjen (1981), the primary purpose

of the message content should be to change primary beliefs about the expectations of specific referents. Only in this manner can the subjective norm be affected.

The basic structure of a message are its arguments, and the evidence used to support the arguments. It is assumed, though rarely tested, that acceptance of the supportive evidence will result in acceptance of the argument and, that acceptance of the argument will lead to a change in the conlusion.

The argument alone can change belief if it is novel and previously non-salient. But, acceptance of an argument does not necessarily lead to yeilding or change in corresponding belief, unless it influences a sufficient number of primary beliefs. There are many steps in this process and the message should consider them all (Fishbein and Azjen, 1981).

III. THEORIES TO EXPLAIN THE SOURCE EFFECT

Numerous investigators have researched the factors that influence the effectiveness of a persuasive communication, one of these factors being source credibility. The main theories that have emergerd from this research are:

    1) Cognitive Response Theory –

       A counterarguing theory by the Hovland

       group at Yale (Hovland, Janis and Kelley, 1953).

    2) Congruity Theory –

       A balance theory (Osgood and Tannenbaum, 1957).

    3) Cognitive Dissonance Theory –

       Justifying of choices (Festinger, 1957).

    4) Self-Perception Theory –

Reasons for behavior (in Sternthal and Dholakia, 1977)

5) Attribution Theory -

Reasons for behavior (Sternthal et al., 1978b)

6) Least Effort Hypothesis -

Behavior causing minimum resistance (Hass, 1981)

I. <u>COGNITIVE</u> <u>RESPONSE</u> <u>THEORY</u>

Although it was once assumed that acceptance of a communication was a function of learning or the retention of the content, there is little empirical evidence to support this (Greenwald, 1968). Instead, support has been found for the hypothesis that a receiver rehearses atitude-relevant thoughts that are aroused by the message content, rather than rehearsing the actual content itself (Greenwald, 1968). These attitude relevant thoughts , which constitute the cognitive response content, are generated by the receiver when making a decision to accept or reject new information. This involves relating the new information to the existing attitudes, knowledge and feelings. Persuasion takes place when the receiver rehearses attitude thoughts (cognitive response content) that support the advocated position, while no persuasion occurs when content opposing the advocacy is rehearsed. The components that influence the "cognitive response content" include setting, source, communication content and receiver characterisitics (Greenwald, 1968).

Cognitive response refers to the response of an individual to a persuasive appeal where the individual rehearses their

issue-relevant thoughts and those presented to them in the message. Message rejection occurs when the receiver is opposed to the communicator's advocacy and generates counterarguments to the assertion made in the message. Source credibility acts also as a mediating force on these counterarguments, in that a high credibility source inhibits counterarguing, while a low credbility source does not. Thus, a high credibility source is more persuasive (Sternthal et al., 1978a, citing Greenwald, 1968).

However, Sternthal et al. (1978a) point out that this is true only if the recipient has a negative predisposition toward the advocacy. If the recipient has a positive predisposition toward the advocacy, there is a greater need to insure that a position they agree with is being adequately represented. Thus, when the source is low in credibility, there is more generation of support arguments and a low credibility source is more persuasive (Sternthal et al., 1978a). However this may not be too significant since the receiver is already favourable toward the advocacy.

Thus the hypothesis evolved that the initial opinion of the recipient is important. If the initial opinion is negative toward the adovocacy, a high credibility source is more likely to be persuasive. If positive, a low credibility source, and if neutral, there is no systematic persuasive effect as counter arguments equal support arguments.

Sternthal et al. (1978a) in their study found that when the message recipients were favourably predisposed to the

message advocacy, the less credible source induced more agreement and support arguments than the high crediblity source, as predicted. And, if negatively predisposed, the high crediblity source caused greater agreement with the advocacy, but there was no source effect on the generation of support arguments, though this may have been due to unfamiliarity with the issue

Counterargumentation is only a special case of the cognitive response formulation. Cognitive response analysis accounts for a wider variety of the observed effects and it addresses situations where individuals are both favourably and unfavourably predisposed to a communication. The limitations of counterarguing is that it applies only to those situations where individuals have an unfavourable dispositon toward an advocacy (Sternthal et al., 1978b).

Cognitive response analysis explains that a response to an appeal entails generation and rehearsal of one's own attitude-relevant thoughts and those included in the message. It involves the short-term memory, where information being actively processed is held and it also involves the long- term memory where information processed earlier is stored.

The incoming message enters the short-term memory as thoughts or cognitive responses. These thoughts trigger the retrieval of further issue-related information, or initial opinions from long-term storage which are then registered in the short-term memory. Thoughts in the short-term memory are rehearsed and consolidated and eventually determine the response

to an appeal.

This theory stresses the importance of initial opinion as a determinant of influence or persuasion. If a recipient is opposed to the message content, incoming information causes retrieval of negative thoughts or counterarguments from the long-term memory. These enter the short-term memory where they are rehearsed and therefore likely to cause rejection of the message. Conversely, if one is favourable toward the message content, support arguments are retrieved from the long-term memory rehearsed and are likely to cause acceptance of the message content.

Sternthal et al. (1978b) were able to show that this theory accounts for the effects of source crediblity on attitude change. If inititally opposed to the message content, a high credibility source will inhibit the generation and retreival of counterarguments from the long-term memory, while a low credibility source will not. If initially favourable to the message, more support arguments are generated if it is only a moderately credible source as the receiver is motivated to generate support for the position. If a high credibility source says so, there is no need for support arguments (Sternthal et al.,1978b).

Message and source credibility interactions are explained by this theory. A highly discrepant or threatening message evokes counterargumenation that is off-set by a highly credible source, but not by a low credibility source. When there is low discrepancy or threat, there is little counterargumentation and

credibility does not affect the outcome (Sternthal et al., 1978b).

If the evidence is unfamiliar or the message is incongruent with the source's best interests, counterarguing is again inhibited and no credibility effect is observed (Sternthal et al. , 1978b)

Audience variables and source crediblity interactions are also explained by cognitive response theory. Persons with high involvement and high internal locus of control facilitate counterarguments themselves and source credibility has no systematic effect. With low involvement or internal locus of control, counterarguments are reduced and credibilty does affect the argumentaton process. In this case, a high credibility source is more persuasive. Since high authoritarians rely on the dominant persuasive cue, a highly credibile source will be more persuasive than a low credibility source when the message contains no support arguments and is highly complex. If the message has support arguments and is not too complex, the message serves as the dominant cue and the source makes no difference (Sternthal et al., 1978b).

Low authoritarians use multiple cues for attitude judgements. When a recipient has no basis for judging the message content, such as when a cultural truism is opposed, the source will serve as the dominant cue and the source will affect persuasion (Sternthal et al., 1978b).

In summary, if only source cues are present, a high credibility source is more persauasive than a low credibility

source for those opposed to the advocacy and a low credibility source is more persuasive for those favourable to the advocacy (Sternthal et al., 1978b).

When the interaction effects of message and individual audience variables are present, source credibility has an observable effect when these variables induce moderate levels of counterargumentation. This would occur when there was substantial threat or discrepancy, in which case a high credibility source would serve to inhibit the counterarguments and increase persuasion.

When there is no evidence or the message is not incongruous with the source's best interests, there is no inhibition of counterargumentation, or when individual differences cause counterargumentaion, (involvement, internal locus of control) credibility of source has no effect. .

Although we speak of source effects, it is actually changes in an individual recipient (which depend on belief about the source) that result in differences in persuasion. By altering the belief about the source, the same message will be processed differently, thereby altering its persuasive effect.

In his review, Hass (1981), states that Hovland and his colleagues initially believed that the source influenced the learning of the message content and if the arguments were learned, persuasion occurred. However, this is not supported by reseach evidence that differences in source persuasiveness are accompanied by differences in comprehension (Hovland et al., 1953; McGuire, 1969). People seem to learn the message content

and then decide to agree or disagree wth it. Instead, source characteristics make the arguments seem stronger or weaker, depending on who is believed to have presented them.

Cognitive response theory suggests that the more able a recipient is to generate counterarguments to the points raised in the message, the less he or she will be persuaded (Hass, 1981). Counterarguments, serve, via the summoning forth of information already posessed, to:

a) Defend ones own position - the persuasive attempt is resisted by justifying rejection of arguments supporting a conterattitudinal position;

b) Compare new information to old - to determine if the new information "fits" into existing knowledge and to determine the worth or subjective correctness of the new information (Hass, 1981) .

It is useful to be open to new information that improves our view of physical and social realities. On the other hand, persistant attitudes facilitate behaviour and promote the stability necessary for optimal social interaction. These two reactions are related to commitment: when a person is minimally committed to a position, openness, flexibility, and redefinition dominate. But, when a person is strongly committed, closedness, stability and self protection prevail.

Thus, when a person is uncommitted, or open, he may be more interested in examining the persuasive content to determine the

best position to take. The message is examined for logical flaws and contradictions in content and objective arguing in order to establish the veracity of the message content.

Conversely, if a person is committed to a position through previous decisions and actions, a person is less tolerant of opposing views and is defensive towards a committed stand. The purpose of counterarguing in this case is to resist persuasion by supporting one's own position and refuting that of the source as well as examining the message content.

Therefore, in terms of source credibility, if a person is uncommitted, the content of the message is examined to determine validity. If the accuracy of the information if suspect, for example, if given by a low crediblity source, there will ensue a more stringent examination of the new information and less persuasion will result. But, with a high credibility source, information is less suspect and so there are less counterarguments generated and more persuasion is the outcome.

If a person is committed, they are disinclined to yield to the persuasion and to produce counterarguments to resist change that might result in a negative outcome. The negative results that might ensue if a person changes his or her opinion possibly include:

      1) lessening of esteem from others;

      2) admission of previous error;

      3) reduction of credibility as a source of information;

      4) blame for misleading others;

5) conflict in choosing a course of action.

If a highly credible source is perceived to be able to present a stronger attack on a committed recipient's opinion, more counterarguing will occurr and less persuasion will result. This is just the opposite for an uncommitted individual who will counterargue more with a less credible source. This has been confirmed by various researchers as reviewed by Hass (1981).

Cognitive response theory is able to account for some of the effects of message structure on persuasion. A message is more persuasive if it disarms the recipent's counterarguments early in the message and if it avoids suggesting new counterarguments until late in the message, or not at all. An implicit refutation at the start of the message will have a greater effect on persuasion with a high crediblity source as the recipient is less likely to counterargue. (Hass, 1981)

II. CONGRUITY THEORY

This theory suggests that we tend to maintain the same attitude toward a person as toward their possessions and actions. If a person is felt to be a high credibiltiy source, but we dislike his message (ie actions), our attitudes toward him are now in an unbalanced state. This unbalance or incongruence, is resolved by :

1) a change in attitude toward the
   message via acceptance or
   reinterpretaion of the message;

2) a change in attitude toward the

communicator;

3) a change in the perceived role

of the communicator in creating

the message.

These changes restore balance or congruity among a receiver's atitudes toward the communicator and the communicator's actions. (Hovland et al., 1953)

The basic principle states:

"Whenever two signs are related by an assertion the mediating characteristic of each shifts toward congruence with that characteristic of the other , the magnitude of the shift being inversely proportional to the intensities of the interacting reactions." (p 200, Osgood et al.,1957).

Congruity principle does not take into account all the variables that influence attitude change, but, it does cover the most significant with respect to the direction of change (favourable/ unfavourable) and the maginitude of change (relative amount). The variables covered include:

1) the existing attitude of a subject toward

a source;

2) existing attitudes toward a concept;

3) the value of the asserton relating them.

The typical situation for attitude change is where a source makes some evaluative statement or asertion about some object or concept in a message that is received and decoded by a receiver. The source and concept each have a sign of +, -, or 0, meaning that the message receiver is favourable, unfavourable or neutral

toward the object., The assertion can be associative, (that is positive) as in 'A is B', or disassociative, as in 'A is not B'. The assertion results in A and B being linked together.

"Whenever two signs are related by an assertion , they are congruent to the extent that the mediating reactions are equally intense, either in the same (compatible) direction, in the case of associative assertions, or in opposite (reciprocally antagonistic) directions in the case of dissociative assertions." (p 203, Osgood et al., 1957)

Congruity occurs naturally if:

1) both sides are equally intense in the same compatible direction;

2) opposite intense signs in a dissociative assertion

3) each side is equally intense, but in the opposite direction eg., a +source dissociates a -object, or a -source dissociates a +object;

Congruity is maintained by shifting evaluations of the source and or the object in the following situations:

1) when both signs are equally intense, but dissociated, the point of congruity is reciprocally antagonistic, that is, in opposite directions and evaluation of the source or the object will shift with whichever is the most intense shifting the least and whichever is the least intense shifting the most.

2) when signs opposite in intensity are related by an associative assertion;

3) a neutral sign is linked by an asociative assertion to a +ve sign, the neutral sign becomes more positive

4) when a neutral sign is linked by a dissociative assertion to a -ve sign, the neutral position becomes more positive eg. "I am against sin". (Osgood et al., 1957).

Congruity principle holds that an image or meaning depends upon other concepts with which it is associated and thus is subject to perpetual change (Anderson and Clevenger, 1963).

"According to congruity theory, when a source advocates a position, there is a tendancy for the recipient's evaluation of both the source and the position to shift to a point of equilibrium or congruity , and those shifts are inversely related to the extremity of the initial evaluation This theory makes predictions regarding both the direction and the amount of change that will occur" (p.146, Hass, 1981).

Whenever a source and an attitude (toward an object , person, or matter) are linked, pressures toward attitudinal congruence arise. If a source expresses a favourable attitude on a topic, congruence occurs when the recipient holds the same attitude toward both the source and the topic. If the source makes an unfavouravble assertion about the topic, congruence occurs when the recipient holds attitudes toward the source and the topic that are equally intense, but opposite in direction.

The theory further predicts that if attitude change is necessary to restore congruity, then both one's attitude toward the source and one's attitude toward the topic will change, with the one that is more extreme changing less.

"More precisely, the degree of change of one's attitude toward the source or the topic will be inversely proportional to the initial polarity of those attitudes i.e. distance from the neutral point" (p 147, Hass, 1981).

Congruity theory makes the reasonable-sounding prediction that linking a source with an attitude proposition may change a message recipient's view of the source as well as their attitude on an issue. Other theories do not allow for the recipient's view of the source to change in addition to or instead of changes in attitude, except for cognitive dissonance theory. The author states, however, that it is probably more likely that the attitude toward the topic would change rather than the attiude toward the source (Hass, 1981).

III. SELF PERCEPTION THEORY

Self perception theory, accounts for the situation where an individual's own experience or behavior, as well as the communication source, are the basis for attitudinal judgements. This theory explains why a low credibility source causes greater persuasion than a high credibility source after individuals have voluntarily complied with the message request, or voluntarily exposed themselves to the message.

By indicating to recipients that their complying behavior was not voluntary, the recipient may focus on the causal

antecedants of the message, such as the message content, evidence or arguments. But, if the choice of compliance is voluntary, individuals focus on the causes of their behavior, rather than on the message itself. If, in this situation, the source is highly credible, the voluntary compliance is attributed to:

a) A positive attitude toward the behavior;

OR,

b) The fact that they were solicited by a highly credible source.

With two rival explanations for their behavior, uncertainty about the reason for behavior and hence attitude is created. However, in the case of a low credibility source, the source is no longer a plausible reason for the resulting behavior, and so there is only one explanation. Thus, there is more certainty regarding the cause of behavior and hence a stronger attitude will result.

In other words, rival explanations of behavior cause uncertainty regarding the cause of behavior and less persuasion will result. When there is only one reason for behavior, there is certainty regarding the cause, and a strong attitude will result ie., more persuasion will take place. (Sternthal and Dholakia, 1977)

IV. ATTRIBUTION THEORY

Attribution theory is so named because it deals with attributing the cause of behaviour to either internal reasons or external reasons. People come to know their attitudes by inferring from their own behaviour and the circumstances in which this behaviour occurs. When behaviour is justified by internal reasons, the individual is more likely to be certain about his/her attitude toward the the object of his/her behaviour. For example, behaviour such as signing a petition (Sternthal et al., 1978b). " I signed the petition, therefore I must believe it."

Even greater certainty about one's attitude occurs when a behavioral circumstance is present that normally inhibits the performance of the behaviour, but this time does not. Behaviour is then justified even more by internal reasons and a strong attitude toward the object of the behaviour is acquired.

However, if circumstances provide rival justifications for behaviour, the individual discounts internal causes and is uncertain as to the cause of the behaviour and is therefore unlikely to have strong attitudes toward the object.

In attribution terms, a high crediblity source causes people to discount internal reasons for their behavior and therefore fail to consolidate a favourable attitude. A low crediblity source causes people to augment internal reasons for their behavior and therefore feel certain about their attitudes and consolidate a favourable attitude (Sternthal et al., 1978b).

The interaction effects of message and source credibility

are explained by attribution theory. An unexpected position from a source increases the receiver's certainty that the message is true and persuasion is augmented. When the expected position is advocated, the receiver is uncertain whether the message represents the truth or just the person's viewpoint. Persuasion will then depend on credibilty. A high credibilty source is likely to induce the belief that the message is valid, whereas a low credibility source is likely to cause disbelief in the validity of the message and less persuasion will occur.

Thus, if a receiver expects a high credibilty source to make statements consistent with his/her own beliefs, increasing the message discrepancy should enhance attitude change. On the other hand, a low crediblity source is expected to make discrepant claims, which are likely to be thought due to the source's bias and therefore have little effect on attitude change. A low credibility source stating a moderately discrepant position results in the message being viewed as accurate and is therefore relatively persuasive.

If a threat is unexpected, for example if it came from a high credibillity source, this source will cause greater persuasion, especially when the threat is substantive.

Since unfamiliar evidence or an incongruous position are more unexpected when they originate from a low credibility source, the theory says that there will be no source effect.

Individual differences are also accounted for by this theory. People with an external locus of control are more likely to rely on source credibility in making causal

attributions and therefore be more persuaded by a high credibility source. Internal locus of control people do not respond to the source effect. High authoritarian people rely on the dominant cue and and low authoritarians employ both the message and source cues.

Attribution theory describes the inferential work individuals perform in interpreting and selecting persuasive cues. However, it does not describe the mechanism of acitve information processing which is described by cognitive response theory. This combinaton of cognitive response and attribution theories , according to Sternthal et al. (1978b) provide complimentary and related explanations of how the communication process works.

This combined process can be summarized in the following paragraphs. Strong initial opinions are stored in the short term memory and the message , upon entering the short term memory, triggers the retreival of thoughts from the long term storage. This thought retreival process is mediated by source credibility. A high credibilty source inhibits counteragrguing if the receiver has a negative initial opinion toward the message content. A low credibiltiy source stimulates support arguments if the receiver has a positive intitial opinion towards the message content. There is no source effect if the initial opinion is neutral and instead, behaviors associated with the message are examined.

If source credibility causes a recipient to discount INTERNAL reasons for behavior, few cognitive responses are

retreived from the short term memory and there is little persuasion. If source credibiltiy causes a recipient to attribute the cause of behavior to INTERNAL reasons, this triggers the retreival of positive thoughts from the long term memory and persuasion occurs.

Failure to comply with the advocacy of a high credibility source leads to counterarguments, whereas, compliance with a low credibiltiy source stimultes suppport arguments , leading to consolidation of an attitude which will serve as the initial opinion in subsequent situations (Sternthal, et al., 1978b).

V.   COGNITIVE DISSONANCE THEORY

As reviewed by Hass (1981), Festinger's cognitive dissonance theory predicts that, under conditions where a recipient voluntarily chooses to expose himself to a persuasive communication, a source will produce more attitude change as the recipient's dislike for a source increases. This is due to the recipient justifying the choice to himself or herself. For example, if the source is disreputable, or unliked, then the individual can not justify the decision to listen to the message on the basis of the source. As a result, the individual justifies the decision to listen by believing that the message itself was worth listening to and will therefore be more influenced by it (Hass, 1981).

This theory has received experimental support in a number of studies in the sixties, but there has been some criticism of the limitations of this theory. These are:

1) several investigators show that the
   theory is incorrect regarding the process
   by which credibility mediates influence
   or persuausion;

2) another theory, attribution theory,
   explains the same effects and it also
   deals with attitude-consisent behavior
   situations that cognitive dissonance does
   not (Sternthal and Dholakia, 1977).

VI. <u>LEAST EFFORT HYPOTHESIS</u>

Another theory that has not received much experimental
support is the least effort hypothesis. This theory, as
reviewed by Hass (1981), suggests that counterarguing and
derogation of the source are alternative means of preventing
persuasion and the recipient enagages in whichever is the least
effort. A low credibilty source is easier to reject or degrade
than to counterargue with the message content. Whereas, with a
high credibility source, it is much easier to counterargue with
the message content than degrade the source. This is opposite
to cognitive response theory as it has a low crediblity source
causing less counterargumentation and a high credibiltiy source
causing more.

Other theories within the field of psychology, such as
Basic Antimony (Hass, 1981) and Theory of Reasoned Action
(Fishbein, 1975) do exist, but, are not adddressed in this
paper.

IV. RELATED STUDIES

There are several studies of source credibiltiy that were
particularly interested in determining the influence of the
receiver's initial attitude on the effectiveness of source
credibility, and the disrepancy of the message from the
receiver's point of view. This is similar to the design of the
present study.

A study on attitudes towards American involvement in
Vietnam, split the audience into two groups, one moderately
negative and the other extremely negative. These two groups
were then exposed to a pro-involvement message attributed to
authors that varied in their credibility.

The results showed that:

1) initial attitude itself did not
differentiate affect the susceptibility
of the subjects to persuasion;

2) the persuasive manipulation was indeed
effective;

3) source crediblity was not significant as
a main effect, but it did interact with
the initial attitude at the a= .05 level;

4) the degree of involvement (knowledge and
interest in the topic) was significant as
a main effect and in interaction with the
initital attitude.

It was concluded that a highly credible source was more

persuasive than a less credibible source, only for those subjects who held extreme initial attitudes (McGuinies, 1973). This is supported by earlier work by Bochner and Insko (1966). In addition, attitude change was found to be greatest for those wth extreme initial attitude, but low involvement (McGuinies,1973).

More recent work studied the perceptions of the credibility of message sources who either agreed or disagreed with receivers of written messages (Jurma, 1981) . Results indicated that message sources were judged equally on the trustworthiness factor, regardless of whether the written message agreed or disagreed with that of the recipient. In addition, low ratings for co-orientaion and expertise were given for the message that disagreed with the recipient's view. As long as a substative message is presented, the disagreeing source can seem reasonably trustworthy and quite charismatic (Jurma, 1981). No measurement of persuasion was made.

Shaffer et al. (1981), in a study of message discrepancy regarding textbook prices, found that those subjects exposed to a highly discrepant message reversed their estimates of a reasonable price increase, the maximum price increase acceptable and the minimum price increase that was unacceptable. The researchers concluded that a simple informational (vs persuasive) communication that was sufficiently extreme, induced changes in the attitudinal constructs to which it was most directly relevant (Shaffer et al., 1981). This situation may be different for a more emotionally charged issue such as food

additives, or in the case of a fad or a cultural truism.

A study by Wheeless (1974), addressed a research question similar to that posed by this researcher:

"How much variance in post attitude intensity can be accounted for by prior attitude and credibility ?" (p.278, Wheeless, 1974).

Although the actual purpose of the Wheeless research was somewhat different from the present study, the results are of interest. In the regression analysis it was found that 61% to 66% of the variance in post attitude intensity could be accounted for by the existing theoretical constructs in attitude (attitude intensity , importance and involvement) and source credibility (competence, socialbility , extroversion, composure and character). A message topic, "The Space Programme", was chosen on the basis that it would maximize the variablity of intensity , importance and involvement. Sources were described as being high, moderate or low in credibility.

In the linear regression, 61% of the variance was accounted for, with pre-attitude intensity accounting for 51% and attitude importance, source competence and source sociability accounting for the remaining 10% of the variance. It is of interest to note that three of the five scales used by Wheeless to measure attitude intensity were the same as those used in the present study to measure attitude.

The field of nutrition education has looked at attitude change theories, but, as yet there has been no research on the role of source in achieving this change (Sims, 1981; Olson and

Gillespie, 1981). In terms of the problem with food misinformation, no studies have addressed the role of source in aleviating the problem.

III. <u>METHODOLOGY</u>

I. <u>POPULATION</u>

Ideally, the target population to which any educational, counter-misinformation would be addressed is the "average consumer". Anyone making food choices in the marketplace, would be a potential target for reliable information. This target population was not readily available however, and instead, an accessible population was utilized.

II. <u>THE</u> <u>SAMPLE</u>

A convenient, non-random sample was used for this study . Nine classes of summer students enrolled in educational psychology courses at the University of British Columbia completed the survey during the month of August, 1982. Approximately 75 were female and 50 male. Many were teachers, and ages ranged approximately from 25 to 45 years. No socio/demographic information was taken. 132 surveys were completed,with 7 being rejected for incomplete or erroneous responses.

The researcher gave the same 5-minute introduction and set of directions to each class. Every attempt was made to minimize any effects of test administration on the outcome. No attempt was made to hide the purpose of the survey. (See Appendix C).

The test booklet and hence the treatment variable source, was randomly distributed among the students.

III. THE INSTRUMENTS

Two Presurveys and a Main Survey were conducted. Presurvey One determined which sources should be used in the main survey, where a pro-food additive message is attributed to these sources. The different sources constituted the treatment variables. Presurvey Two determined which statements about food additives should be used in the main survey to measure the attitudes and beliefs of the respondants about food additives.

The Main Survey was contained in a booklet with an attitude and belief measure; a pro-food additive message attributed to one of the three sources chosen from Presurvey One, or no source in the case of the control group; and a post-measure of belief in the pro-food additive message.

I. PRE-SURVEY ONE, CHOICE OF SOURCES

Within the research design model, a number of potential sources of food additive information were required to serve as treatment variables. From the extensive literature on factors that measure source credibility, the recent publication by McCroskey, (1981) was used to develop the meaurement instrument. McCroskey's review of research in the field of source credibility concluded that there were only two factors that best measured source credibility: 1) perceived source competence and 2) perceived source character. The third theoretical factor of source credibility, intention, is practically measured by the character factor (McCroskey, 1981).

The scale utilized in Presurvey One consisited of six

seven- point scales anchored by six bipolar adjective pairs. Three of the pairs measured character and three measured competence The scales used to measure competence and character are presented in Table 1.

Table I - Source Credibility Measurement Scales

CHARACTER

honest   - - - - - -   dishonest

trustworthy   - - - - - -   untrustworthy

sympathetic   - - - - - -   unsympathetic

COMPETENCE

competent   - - - - - -   incompetent

inexperienced   - - - - - -   experienced

trained   - - - - - -   untrained

These adjective pairs have been reported to yield reliable and valid scores on these factor (McCroskey 1966).

Several potential sources of information about food additives that were available to the public were rated to determine which of the sources should be used in the main survey as the sources of the pro-food additive message (ie. treatments). These potential sources were:

      1) a consumer reporter   (C.R.)

      2) a government spokesman (G.S.)

      3) a medical doctor   (M.D.)

      4) a food scientist   (F.S.)

5) an annonymous reporter (A.R.)

6) a nutritionist   (Nutr.)

7) a health food advocate (H.F.A.)

Twenty-two copies of Presurvey One were randomly distributed among students within the Department of Food Science at UBC. Students were asked to choose which word in the adjective pair best described their feelings about the source of information on food additives. See Appenndix A for actual questionaire used.

Table II -
Scores and Reliability of Source Credibility Measure

Source	Mean Score	Std. Dev.	Competence Score	Character Score	Hoyt Rel.	S.E.M.
M.D.	31.45	5.51	5.10	5.40	0.87	1.84
F.S.	34.91	3.80	6.20	5.43	0.65	2.05
C.R.	28.05	6.48	4.43	4.93	0.87	2.14
G.S.	25.45	4.01	4.46	4.03	0.49	2.60
A.R.	22.09	4.57	3.33	4.03	0.79	1.93
Nutr.	39.64	4.36	6.16	5.73	0.74	2.04
H.F.A.	24.64	3.68	3.70	4.53	0.51	2.35

The LERTAP computer analysis was conducted to generate an overall mean credibility score, mean competence score and mean character score , as well as the Hoyt Reliability Coefficient

for the whole model and the standard error of measurement for the whole model. These values are presented in Table II.

From Table II, it can be seen that the top three mean scores for credibility are:

1. Nutritionist   (Nutr.)

2. Food Scientist   (F.S.)

3. Medical Doctor   (M.D.)

The mean charater scores were plotted against the mean competence scores for each source (Figure 1). The top three sources were then chosen for inclusion in the message part of the Main Survey.

Figure 1 - Credibility Ratings of Sources of Food
Additive Information
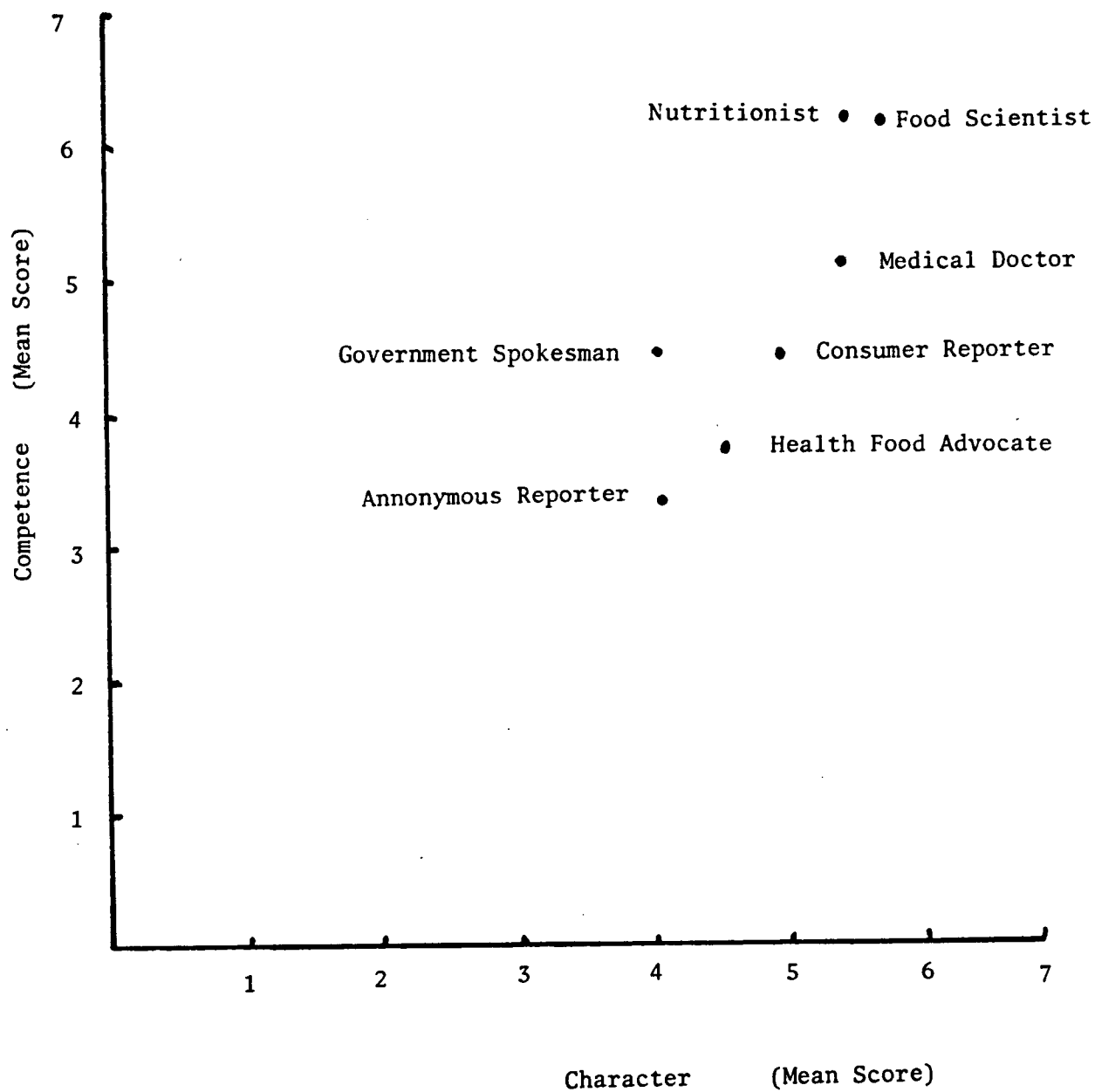
From Figure 1., it can be seen that the food scientist, the nutritionist and the medical doctor were the most credible as rated by the small sample of food science students.

The nuritionist received the top mean score, the consumer reporter (C.R.) had the mid score (28.05) and the annonymous reporter (A.R.) was scored the lowest (least credible), with a mean score of 22.09 over both the character and competence measures.

The Hoyt Reliability Coefficient is an estimate of the amount of variation in ratings on the scales that is due to individual differences, taking into account variations due to the specific nature of the items and the unaccounted for variation, or error. If the scale is highly reliable, the source of variation due to individuals is high compared to the other sources of variation. A value of .74 or greater is desireable (Nelson, 1978). The Hoyt Reliability Coefficient for the Food Scientist does not meet this requirement. However, it was felt that the high score outweighed this criterion. Most studies comparing credibility chose a high, medium and low credibility source to determine if there was any difference between the three types, but in this case, the interest is in determining if the most credible sources are indeed effective.

II. PRE-SURVEY 2, SELECTION OF STATEMENTS

The purpose of this survey was to determine which statements about food additives should be included in the main survey to measure attitudes and beliefs about food additives. It was hypothesized, based on the literature, that individual

attitudes may influence belief in a pro-food additive message (Hass, 1981; etc.). In addition, a covariate: belief in the statements about food additives was included to increase the probability of detecting a statistically significant interaction between attitude toward food additives and the source of the message (Maxwell and Delaney, 1981).

Twenty-two statements about food additives were generated from previous surveys that measured food additive attitudes (Boocock, 1978, Duffek,1978; Knox and Schreiber, 1980; Martinsen and McCullough, 1977; and Zibrik et al, 1981); from literature documentation of misinformation (Francis, 1979; Clydesdale, 1980; Hall, 1973, 1977); and from expert advice and personal experience. These statements are listed in Table III.

These statements covered a range of attitudes (positive, neutral and negative) and a range of extremes (strong, quite strong, slightly strong and weak) (Tables IV and V).

Respondents were asked to determine the relative position of each statement on a seven-point scale indicating how strongly positive or how strongly negative the statements were felt to be.

The statements were in the format of an assertion made directly about the subject - food additives. The format, X--------> Y, where X represents the subject of the assertion; --------> represents the assertion and Y the object to which the subject is linked, was used. This format, X-------> Y , attempts to reduce extra thoughts that might result from misinterpretation (Osgood et al., 1957).

Thirteen graduate and summer students in the Department of Food Science at The University of British Columbia completed the survey in May of 1982. Two returns were rejected for incorrect completion.

With respondents having a food science background completing the survey, statements that w relatively pro-food additive were expected to be indicated as being positive, while those that were relatively anti-food additive or untrue in nature would be marked as negative. See Appendix A for actual questionaire used.

Table III - Food Additive Statements Used in Pre-survey #2

1. Food additives do not improve food quality.

2 Food additive scares are absolute nonsense.

3. Food additives cannot be linked to human death.

4. Food additive effects on human health are extremely speculative.

5. Food additives are a serious risk to health.

6. Food additives are sensationalized in the media.

7. Food additive testing is inadequate.

8. Food additives are harmless.

9. Food additives cause disease.

10. Food additive use is out of control.

11. Food additives should be avoided

12. Food additives are used for company profits only.

13. Food additives disguise inferior products.

14. Food additives are really only a monor risk to health.

15. Food additives are safe for children

16. Food additives mean everyone has enough to eat.

17. Food additives should be eliminated from food.

18. Food additives are potentially hazardous.

19. Food additives are adequately controlled by food regulations.

20. Food additive testing ensures safety.

21. Food additives cause cancer.

22. Food additives are necessary in the modern food supply.

To determine which of the twenty-two statements to include in the survey, mean scores and standard deviations were obtained for each statement. Three statements were chosen from the high scoring grouping (pro-food additives) and three from the group with the lowest scores (anti-food addtives). Choice of the six statements was based on the high, mid and low mean scores within each group and on the standard deviation.

(Table VI).

Table IV - Corresponding Positive Statements

Statement	Average Score (7-point scale)
15. Food additives are safe for children.	5.9 *2
8. Food additives are harmless.	6.1 *1
14. Food additives are really only a minor risk to health.	4.1
22. Food additives are necessary in the modern food supply.	5.4 *5
16. Food additives mean everyone has enough to eat.	5.6 *4
5. Food additives are sensationalized in the media.	3.6
2. Food additive scares are absolute nonsense.	4.6
19. Food additives are adequately controlled by food regulations.	5.1 *6
20. Food additive testing ensures safety.	5.9 *3
3. Food additives cannot be linked to human health.	5.1 *7
4. Food additive effects on health are extremely speculative.	3.9

*=Rank order of statements based on mean scores.

Table V - Coresponding Negative Statements

Statement	Average Score (7-point scale)	
11. Food additives should be avoided.	3.0	
17. Food additives should be eliminated from food.	1.9	*3
9. Food additives cause disease.	2.5	*6
21. Food additives cause cancer.	1.4	*1
18. Food additives are potentially hazardous.	2.6	
6. Food additives are a serious risk to health.	2.1	*4
13. Food additives disguise inferior products.	2.6	
1. Food additives do not improve food quality.	3.3	
12. Food additives are for company profits only.	1.8	*3
10. Food additive use is out of control.	2.4	*5
7. Food additive testing is inadequate.	3.0	

*=Rank order of statements based on mean scores.

Table VI - Ranking of Statements as Positive or Negative

Positive Statements	Total Score	Average Score	Std. Dev.
8. Food additives are harmless.	46	6.1	1.4
15. Food additives are safe for small children.	47	5.9	0.83
16. Food additives mean everyone has enough to eat.	45	5.6	1.1
9. Food additives are adequately controlled by Food Regulations.	41	5.1	1.3
20. Food additive testing ensures safety.	47	5.9	1.1
22. Food additives are necessary in the modern food supply.	43	5.4	0.75
Negative Statements			
13. Food additives disguise inferior products.	21	2.6	1.2
18. Food additives are potentially hazardous.	19	2.6	1.4
10. Food additive use is out of control.	19	2.4	1.8
6. Food additives are a serious risk to health.	17	2.1	1.6
17. Food additives should be eliminated from food.	15	1.9	0.99
12. Food additives are used for company profits only.	14	1.8	0.89
21. Food additives cause cancer.	11	1.4	0.52

From Tables IV and V, the statements that were the most polarized into positives and negatives were listed in Table VI. From this reduced list of thirteen statements, the top and bottom of each group was chosen, i.e., the lowest and highest scores. In the negative group, Statement 6 had a score close to the average for that group, and so was chosen as the third statement. In the positive group, Statement 16 was the closest to the average, but, the standard deviation was less in statement 22., (0.75 vs. 1.1), and , the phrasing in Statement 16, ..."Food additives _mean_....." was not a direct assertion

on the object , while Statement 22 was a clearer assertion: "Food additives <u>are</u> necessary.".

In addition, it was desireable for completeness, to have corresponding and opposing statements in order to cover the total range of possible sentiments regarding food additives. The following statements meet this requirement: 21 vs. 8; 19 vs. 6; an 13 vs. 22. Therefore, Statement 22 was chosen over Statement 16. These statements also cover a range of extremes, falling into the following categories respectively:

21. Food additives cause cancer.

8. Food additives are harmless.

6. Food additives are a serious risk to health.

19. Food aditives are adequately controlled.

22. Food additives are necessary in modern food.

13. Food additives disguise inferior products.

The statements were rated as such in the presurvey. These six statements were used in the measure.

III. THE MAIN SURVEY

The main survey (Appendix C) consisted of a number of sections as described below.

a. General Directions

The general directions were given, stating the purpose of the survey, the use of the results, the time alotted, and the three parts of the survey. Also that completion was voluntary, that refusal to participate would in no way affect class

standing and that completion of the survey would be taken as consent.

b. Part 1 - Your Opinion

i. Directions and Example

Respondents were instructed to indicate their feelings about the statement by placing an "X" on one of the seven spaces that separated each adjective pair, according to how closely related their feelings were to that word.

ii. The Measure

In this section, the attribute variable: attitude toward food additives, as well as the covariate: belief in food additive statements, were measured. Fishbein's attitude/belief measure was used, with each concept measured by four bipolar adjective pairs (Fishbein & Raven, 1967). Attitude was measured by 'wise-foolish; good-bad; sick-healthy; and harmful-beneficial'. Belief was measured by 'likely-unlikely; improbable-probable; true-false and possible-impossible'. Each adjective pair was separated by seven spaces. The respondent indicated which of the spaces most closely represented his or her sentiments regarding the statements.

iii. Scoring the Measure

Individual scores were obtained for a respondent's attitude (attribute variable) and belief in the statements (covariate). The belief/attitude measure consisted of eight pairs of adjectives; four measuring belief and four measuring attitude

(Fishbein and Raven, 1967).

For the belief measure, the followng four adjective pairs used were arranged in the following manner:

Ex.   Food additives are necessary.

likely <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> unlikely

improbable <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> probable

possible<u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> impossible

true <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> false

A high score indicates a strong belief and a low score, a weak belief. There are seven spaces between the adjective pairs, and the respondent was asked to mark the space that most closely reperesented his/her association with the statement. The scoring indicated is for both postive and negative statements.

For the attitude measure, another set of four adjective pairs that were designed to tap the attitude domain were used. Again there are seven spaces between the adjective pairs and the respondent was asked to indicate which space most closely corresponded to his/her sentiments regarding the statement. A high score indicates a positive attitude and a low score a negative attitude. Scoring is reversed for the positive and negative statements. The adjective pairs and scores for responses to the positive statements are as follows:

Ex. Food additives are harmless.

good <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> bad

wise <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> foolish

beneficial <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> harmful

healthy <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> <u>2</u> <u>1</u> sick

Therefore, a person who is anti-food additives, will have negative sentiments about this positive statement and should theoretically mark the unfavourable end of the scale and thus receive a low score. On the other hand, a person who is in favour of food additives theoretically will have favourable sentiments about the statement and thus indicate the favourable end of the scale and obtain a high score.

For the anti-food additive statements, the response and therefore the scoring is reversed, as shown in the following example:

Ex. Food additives cause cancer.

good <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> bad

wise <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> foolish

beneficial <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> harmful

healthy <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> sick

The respondent who is favourable toward food additives will be unfavourable toward the sentiments expressed in the statement, and will indicate the unfavourable end of the scale, which now receives the high score, and the pro-food additive attitude obtains the high score.

Conversely, for the person who is anti-food additives, the statement theoretically expresses sentiments toward which he/she is favourable. Thus the response will be at the favourable end of the scale, which is now awarded the low score, and the anti food additive respondent will receive a low score.

iv. <u>Reliablity</u> <u>Testing</u> <u>of</u> <u>the</u> <u>Instrument</u>

The attitude and belief measures were tested for reliability using The Hoyt Reliability Coefficient and standard error of measurement. Correlations between the four adjective pairs (items) and a) the statements (subtest) and b) all six statements (total test) were obtained. Correlations between each of the statements and the overall test were also obtained. Analysis of variance (ANOVA) was conducted on the responses to each statement and for the total test of all six statements.

Table VII summarizes the various forms of the instrument that were tested.

The original instrument (1a & 1b) was found to be unreliable on the belief measure (ie. Hoyt <.74). Therefore, various combinations of statements and items were analyzed to obtain the most reliable test instrument. Detailed results of

the reliability testing are in Appendix D.

From the reliability analysis, it was concluded that the use of an instrument consisting of positive statements only was the most reliable and also accounted for a reasonable amount of variance in the dependant variable. All further analyses were based on the use of this instrument consisting of the positive statements only.

Table VII - Summary of Analyses of Instrument Reliability

TEST #	TEST DESCRIPTION	HOYT	MSI
1.a	Attitude (total test, anti-& pro-statements)	0.87	113.69
1.b	Belief (total test, anti-& pro-statements)	0.58	138.32
2.a)i	Attitude (anti-& pro-statements) (minus item 1 on anti)	0.85	125.33
a)ii	Belief (anti-& pro-statements) (minus item 4 on pro)	0.46	140.96
3. a)	Pro-Statments Only		
	i Attitude	0.90	64.81
	ii Belief	0.88	62.18
b)	Anti-Statements Only		
	i Attitude	0.83	48.49
	ii Belief	0.63	202.79
4. a)	Pro-Statements Only		
	i Belief (minus item 4)	0.85	45.23
b)	Anti-Statements Only		
	i Attitude (minus item1)	0.86	8.62
5.	(Minus 9 surveys with belief score <4)		
a)i	Belief (n=116)	0.86	8.18
b)i	Attitude (n=116)	0.84	48.05
	ii Attitude (n=116, minus item 1)	0.86	8.73

6. The dependant variable, Belief in Pro-

Food Additive Message.   0.96   5.59

7. Due to poor Coefficient of Determination

   for anti-statement instrument, the

   pro-statement instrument was tested.

   Pro-statements:

   a)i Belief (n=116)   0.90   61.09

     ii Belief (n=116, minus item4)   0.86   1.92

   b)i Attitude (n=116)   0.87   59.16

c. Part 2 The Message

The message, written by the researcher, expressed pro-food
additive sentiments. The arguments were expressed forcefully in
order to encourage a source effect (Hass, 1981).   The message
was meant to typify an attempt to counteract misinformation
regarding food additives.

The message started out by raising opposition viewpoints,
such as the public is uncertain about food; that labels require
a degree in chemistry to be understood; and names of additives
are difficult to pronounce.

Next came the main point or conclusion of the message: that
the risk to health from food additives has been greatly
exaggerated.

Arguments used to support this point included quotes by
experts regarding cancer statistics; the benefits of food
additives; that concerns have been exploited by the media; that
additives are adequately controlled; that "all natural" may be a
sham; and the reason for worry is due to a lack of common sense.

The message was typeset to appear as though it were a clipping from a newspaper or magazine.

The source of the message ie, the author, was printed after the last line of the article. In brackets below this, an editor's note identified the source as a food scientist, or nutritionist or medical doctor or, in the case of the control, no editor's note appeared.

d. <u>Part 3 - Your Reaction to the Message</u>

v. <u>Directions and Example</u>

Respondents were asked to indicate their reaction to the information in the message, keeping in mind the source of the message. Further directions were similar to those described in 2(a). An actual sample of a bipolar adjective pair, separated by 7 spaces was given. Respondents were asked to indicate how closely related the chosen adjective was to their reaction , by the location of the "X" on one of the 7 spaces.

vi. <u>The Measure</u>

At the top of the page, the following directions were given:

"Please keep in mind the WRITER of the message, as identified at the end of the article. What is your reaction to the information in the message? Place an "X" in the appropriate space for each adjective pair."

This was followed by the four adjective pairs that measure belief, plus a fifth pair, true-false. This latter pair was not used in the analysis.

The frequency of responses for each of the 7 possible categories for the belief in the statement measure; for the attitude measure and for the belief measure were obtained, tabulated and displayed in histograms. These results were used in an attempt to explain the results of the graphing of regression planes given in Figure 2, Chapter 4.

Mutliple regression analysis was conducted and partial regression coeffecients generated for each variable, using the BMD:03R computer programme. An ANOVA was run on the mean scores of the variables. The results of multiple regression analysis were analysed following Pedhazur's (1982) six steps, and the regression planes were graphed.

IV. ANALYSIS OF THE RESULTS

I. DESIGN

In this design, an ATTRIBUTE FACTOR, attitude toward food additives, was a continuous variable. Subjects were randomly assigned to TREATMENT GROUPS that received a common message about food additives from different sources.

It is reasonable to expect that belief scores in response to a food additive message will vary across levels of attitude (degree of favourableness/unfavourableness) toward food additives (McGinnies, 1973; Hass, 1981; McCrosky, 1978). Since subjects representing different levels of favourableness toward food additives may also differ in their beliefs about statements made about food additives, another variable, called the COVARIATE, which is beliefs about food additive statements, is

included. This variable allows for differences due to belief strength and permits a more powerful test for the interaction between food additive attitude and the source of a food additive message by reducing the residual error (Delaney and Maxwell, 1981).

II. THE MODEL

The design of this study follows a special case of multiple regression using an attribute by treatment interaction (ATI) model (Delaney and Maxwell, 1981).

The following is the model on which this design is based:

$$Y_{ij} = \beta_0 + \beta_1 X_{ij1} + \beta_2 X_{ij2} + \beta_3 X_{ij3} + \beta_4 X_{ij4} + \beta_5 X_{ij5} + \beta_6 X_{ij6} + \beta_7 X_{ij7} + \beta_8 X_{ij8} + \epsilon_{ij}$$

Where:

i	$= 1, 2, \ldots N$
j	$= 1, 2, 3$ (treatment level, i.e. souce of message)
Y_{ij}	= The DEPENDENT VARIABLE belief in the message
β_0	= A CONSTANT
$\beta_1 - \beta_8$	= Partial regression weights of variables X1 to X8
X1, X2, X3	= EFFECT CODING VECTORS denoting which SOURCE the subjects received.
X4	= the COVARIATE, belief in food additive statement
X5	= the ATTRIBUTE, attitude towards food additives
X6	= the INTERACTION between X1 and X5
X7	= the INTERACTION between X2 and X5
X8	= the INTERACTION between X3 and X5
ϵ_{ij}	= RESIDUAL error

i. Effect Coding of Treatment Variables

Effect coding is typically used in factorial designs in which treatment groups are likely to be of unequal size and interactions are likely to be significant. Effect coding leads to partial regression weights for treatment variables which are equivalent to treatment effects in an ANOVA.

Although there were only three vectors used to identify the treatments, all four sources were accounted for, and were coded as can be seen below:

	X1	X2	X3
SOURCE 1	1	0	0
SOURCE 2	0	1	0
SOURCE 3	0	0	1
SOURCE 4	-1	-1	-1

This vector coding is called effect vector coding, and is required by the design of the research. In multiple regression analysis involving treatment, the number of treatment vectors used is always one less than the the number of treatment groups. The fourth treatment group is identified in terms of the way the three treatment vectors are coded (Kerlinger and Pedhazur, 1973).

V. STATISTICAL HYPOTHESES

Statistical Hypothesis #1

To test the regression model to determine if a statistially significant amount of variance is accounted for, the following null hypothesis was

tested statistically at the a=.05 level of
significance:

HO: B1=β2=β3=β4=β5=β6=β7=β8=0

(none of the variables account

for significant variance)

H1: Not all β's equal 0

(some of the variables in the

equation account for a significant

amount of variance)

Statistical Hypothesis #2

To test Research Hypotheses #3, the following null
hypothesis was tested statistically at the a=.10
level of significance:

HO: β6 = β7 = β8 = 0 (i.e. there are no signif-
icant interaction effects)

H1: β6,β7,β8 are not all equal to 0

Statistical Hypothesis #3

To test Research Hypothesis #1, the following null
hypothesis would be tested statistically at the α=.05
level of significance if there were no significant
interaction effects:

HO: β1=β2=β3=0, (ie., no significant effects due
to source of the message)

H1: not all β's are equal to 0.

Statistical Hypothesis #4

To test Research Hypothesis #2, the null hypothesis
would be tested statistically at the $\alpha = .05$ level of
significance, if there were no interaction effects:

HO: $\beta 5 = 0$ (i.e., no significant effects due to
                    receiver attitudes toward food addtives)

H1: $\beta 5$ is not equal to 0

These statistical hypotheses were tested using multiple
regression analysis and are reported in the following chapter.

IV. RESULTS

I. MULTIPLE REGRESSION ANALYSIS

A linear multiple regression analysis was conducted on the values of variables in the regression equation.

The model of the regression equation is repeated here for the convenience of the reader:

$$Y_{ij} = \beta_0 + \beta_1 X_{ij1} + \beta_2 X_{ij2} + \beta_3 X_{ij3} + \beta_4 X_{ij4}$$
$$+ \beta_5 X_{ij5} + \beta_6 X_{ij6} + \beta_7 X_{ij7} + \beta_8 X_{ij8} + \epsilon_{ij}$$

Computer anlaysis using the BMD:03R programme, generated a correlation matrix, Coefficient of Determination, the partial regression wieghts for each of te variables in the model, and an ANOVA table (analysis of variance, including F-value).

The correlation matrix shows the degree to which variables are correlated with each other, i.e., how much they overlap. If variables are truly independent, the correlation should be less than 0.50. If variables are correlated, i.e., measure the same thing, the correlation coefficient will be close to 1.00.

Table VIII -
Correlation Matrix of Variables in the Regression Equation

	1	2	3	4	5	6	7	8	Y
1	1.00	0.49	0.49	-0.16	0.02	0.94	0.47	0.43	0.04
2	-	1.00	0.48	-0.17	-0.02	0.46	0.95	0.43	0.04
3	-	-	1.00	-0.01	0.16	0.46	0.46	0.96	-0.02
4	-	-	-	1.00	0.73	-0.16	-0.19	-0.02	0.63
5	-	-	-	-	1.00	0.03	-0.04	0.13	0.57
6	-	-	-	-	-	1.00	0.49	0.46	-0.01
7	-	-	-	-	-	-	1.00	0.46	0.07
8	-	-	-	-	-	-	-	1.00	-0.04
Y	-	-	-	-	-	-	-	-	1.00

(Variables 1,2 and 3=Treatment Codes; 4=Covariate; 5=Attribute; 6,7 and 8=Interaction Variables; and Y=Dependent Variable.)

In Table VIII, it can be seen that X4, the covariate (belief in the statements) and the attribute variable, X5 (attitude toward food additives) have a correlation coefficent of 0.73, which is quite high. When two variables that are meant to be independent are found to be correlated, there arises the posssiblity of multicolliniarity. Multicolliniarity is a problem which leads to the calculated F value being underestimated, and doubts are cast upon the validity of the statistical analysis (Wonnacut and Wonnacut, 1978). In order to test whether or not multicolliniarity is the problem here, Lewis-Beck (1980) recommends that each independent variable be

regressed on all the other independent variables in the equation. When any form of the coefficient of determination from these equations is near 1, multicollinearity is highly probable.

Table IX - Test For Multicollinearity

Regression of Independent Variable j on the Remaining Seven Independent Variables	Coefficient of Determination	
	Full Model	Reduced Model
X1 on remaining 7 variables ($R^2$1.2345678)	0.90	0.34
X2 on remaining 7 variables ($R^2$2.1345678)	0.90	0.34
X3 on remaining 7 variables ($R^2$3.1245678)	0.91	0.36
X4 on remaining 7 variables ($R^2$4.1235678)	0.21	0.19
X5 on remaining 7 variables ($R^2$5.1234678)	0.24	0.19
X6 (=X1X5) on remaining " ($R^2$6.1234578)	0.88	-
X6 (=X2X5) on remaining " ($R^2$7.1234568)	0.89	-
X8 (=X3X5) on remaining " ($R^2$8.1234567)	0.90	-

From Table IX, it can be seen that the Coefficients of Determination for the Full Model (no variables removed) are close to a value of 1.00 for X1, X2, X3, X6, X7, and X8. This makes sense as the 6,7 and 8 are the ATI terms and consist of the product of the treatment terms (X1, X2 and X3) and the attribute term (X5). When the interaction terms, X6, X7 and X8 are removed, as shown in Table IX under Reduced Model, none of the Coefficients of Determination are close to a value of 1.00. Thus, with the reduced model there is no problem wth multicolliniarity. It is not a serious enough problem to abandon the whole model. It is interesting to note that the

attribute and covariate are not collinear, as was first thought from the correlation matrix (0.72). Thus, when the full model is used, it must be remembered that any F value calculated will be underestimated (Lewis-Beck, 1980).

Table X - ANOVA For the Full Model

$R^2 Y.12345678 = 49.23\%$			BO =0.53	
Source of Variance	Degrees of Freedom	Sums of Squares	Mean Squares	F Value
Due to Regression	8	167.84	20.98	14.06
Deviation about				
Regression	116	173.12	1.49	
Total	124	340.96		

Table XI - Multiple Regression Analysis - Full Model

Variable	Estimates of the Model Partial Regression Coefficient	Proportion of Variance Increment
X1	1.5770	0.00
X2	0.1801	0.00
X3	-0.8246	0.00
X4	0.7071	0.44*
X5	0.3375	0.02
X6	-0.3481	0.02
X7	0.0514	0.02
X8	0.1032	0.00
* 44% of the variance in Y was accounted for by X4		

II. THE SIX STEPS IN THE ANALYSIS

The following analysis follows the recommended six steps in analysis of multiple regression (Pedhazur, 1982).

Step1.a) Is the porportion of variance accounted for by the full model significant?

$$R^2 Y.12345678 = 49.23\%$$

This indicates that the variables in the regression equation, i.e., the attitude measure; the covariate, belief in the statements; and the treatments, sources, account for almost 50 % of the variance in belief in the pro-food additive message. This amount seems reasonable when compared to the 51% that

Wheeless (1978) was able to account for in his study which involved a similar model. In addition, in terms of the variables that are known to affect belief in a message, such as message style, arguments, the appearance of the message, the other source factors and numerous audience variables which were not included as variables, the 49.23% variance obtained is quite satisfactory.

Step 1.b) Is the overall regression equation significant?

I. STATISTICAL HYPOTHESIS #1

HO: $\beta 1 = \beta 2 = \beta 3 = \beta 4 = \beta 5 = \beta 6 = B7 = B8 = 0$

H1: not all β's = 0

From ANOVA, Table XIII: F(calculated) = 14.0584

The tabled value of F: .95 F (8,116)   = 2.02

Since the calculated F is greater than the tabled value, reject Ho: that all variables do not account for a significant amount of variance. Some of the variables therefore do account for a significant amount of variance in belief in the message.

Step2. Is there any significant interaction?

II. STATISTICAL HYPOTHESIS #2

HO: $\beta 6 = \beta 7 = \beta 8 = 0$

H1: not all β's = 0

$$F = \frac{(R^2 Y.12345789 - R\ Y.12345) \ / \ k1-k2}{(1-R2Y12345789) \ / \ n-K1-1}$$

$$= \frac{(0.4923 - 0.4672) \ / \ 8-5}{(1-0.4923) \ / \ 125-8-1} = 1.91$$

The tabled value of .90 F 8,116   = 1.72

Since the calculated F value is greater than the tabled value, we reject H0, and thus,it is tenable that there are significant interaction effects. That is, the sources and the respondent's attitudes interact together to influence the amount of belief in a pro-food additive message.

Because of this interaction, it now becomes inappropriate to look at the remaining statistical hypotheses, #3 and #4. That there is an interaction between the source of the message and the attitude of the respondent precludes any unique effect by the sources alone, or by attitude alone. Therefore, steps 3,4 and 5 were not carried out, and the analysis proceeded to Step 6 in Pedhazur (1982).

Step 6. Plotting the Treatment Regression Planes

The overall estimated regression equation is:

$$\hat{Y}_{ij} = 0.5186 + 1.577 X_{ij}1 + 0.1801 X_{ij}2 + (-0.8246) X_{ij}3$$
$$+ 0.7071 X_{ij}4 + 0.3375 X_{ij}5 + (-0.3481) X_{ij}6 + 0.5143 X_{ij}$$
$$+ 0.1032 X_{ij}8$$

Where the b-estimates (partial regression coefficients) are given in Table XIII.

The individual treatment regression planes were obtained as follows:

Example 1. <u>Treatment 1, Nutritionsit</u>

In this case, the following variables in Equation have the values:

$$X1=1 \qquad X2=0 \qquad X3=0$$

$$X6 = X1X5 =X5 \qquad X7 = X2X5 = 0 \qquad X8 = X3X5 = 0$$

The treatment plane equation becomes:

$$\hat{Y}ij = 2.10886 + 0.7071Xij4 - 0.0106Xij5$$

This equation was graphed as shown in Figure 2. In a similar way, the treatment equation was obtained and graphed for the other teatments.

Treatment 2, Food Scientist

$$X1=0 \qquad X2=1 \qquad X3=0$$

$$X6 = X1X5=0 \qquad X7 = X2X5 =X5 \qquad X8 = X3X5 = 0$$

The treatment plane equation becomes:

$$\hat{Y}ij = 0.71196 + 0.7071Xij4 + 0.38893Xij5$$

Treatment 3, Medical Doctor

$$X1=0 \qquad X2=0 \qquad X3=1$$

$$X6 = X1X5 = 0 \qquad X7 = X2X5 = 0 \qquad X8 = X3X5 = X5$$

The treatment plane equaion becomes:

$$\hat{Y}ij = -0.29274 + 0.7071Xij4 + 0.4407Xij5$$

Treatment 4, Control

$$X1=-1 \qquad X2=-1 \qquad X3=-1$$

$$X6 = X1X5 = (-1)X5 \qquad X7 = X2X5 = (-1)X5 \qquad X8 = X3X5 = (-1)X5$$

The treatment plane equation becomes:

$$\hat{Y}ij = - 0.29274 + 0.7071Xij4 + 0.5310Xij5$$

These equations were graphed in a space spanned by three dimensions: attitude (X4), and belief (X5), and belief in the message ((Figure 2).

Figure 2 - Graph of Treatment Regression Planes

Belief in Message
(Dependent Variable)

Food Scientist
Control

Medical Doctor

Nutritionist

XS

Attitude Toward Food Additives
(Attribute Variable)

Belief in Statements
(Covariate)

X4
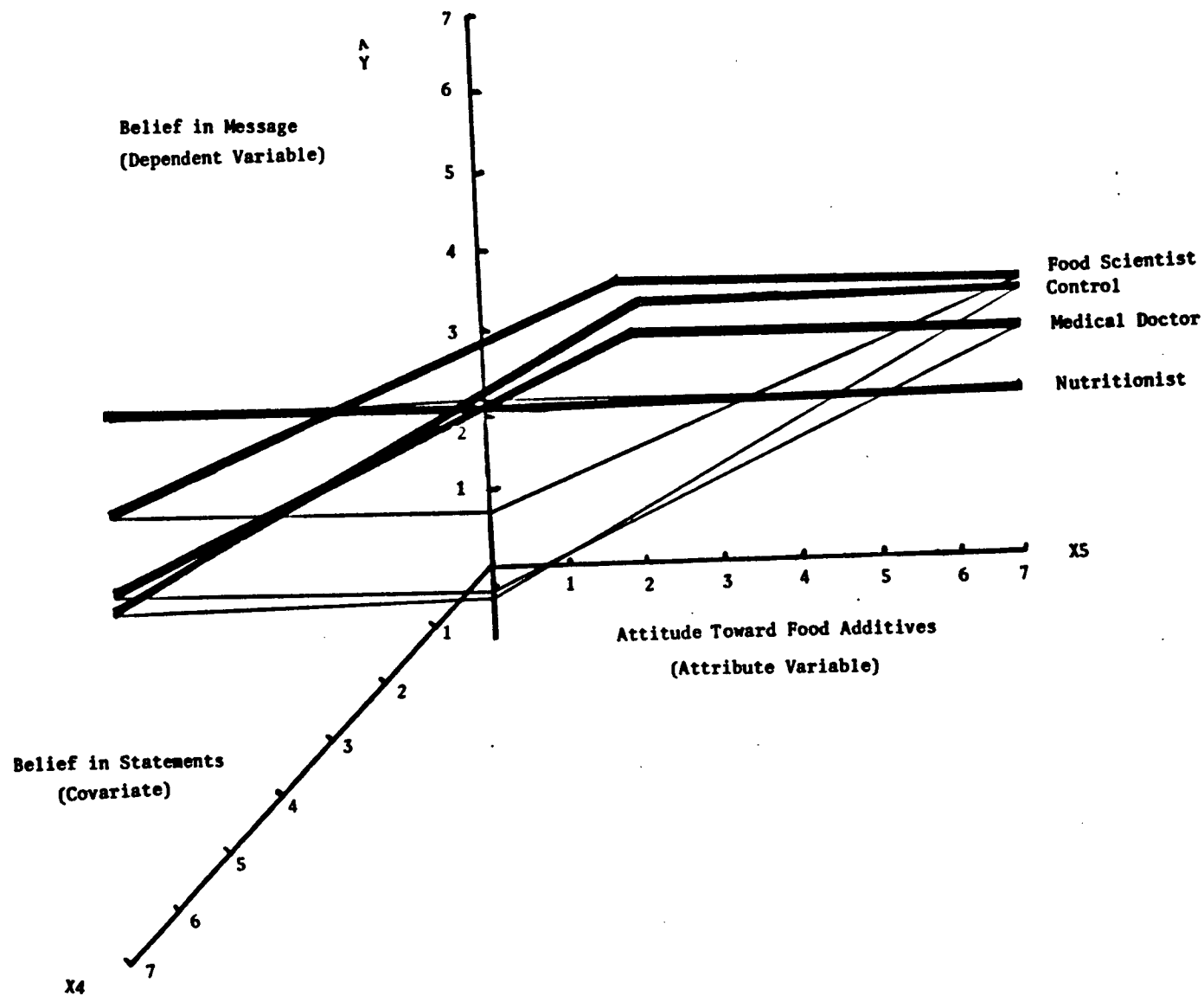
As can be seen from Figure 2, there is indeed an interaction between the treatment variables (source) and the attribute variable, attitude toward food additives. The belief in the message does not change appreciably over the range of attitude levels for those respondents who received the message from the nutritionist. As the nutritionist was rated the most credible, perhaps the credibility effect overcomes the attitude effect.

The other three sources have reasonably similar slopes (0.39 for Source 2, the Food Scientist; 0.44 for Source 3, the Medical Doctor and 0.53 for Source 4, the control).

Because the effects of attitude alone, the treatment alone and the belief in the statements alone cannot be interpreted statistically, it is of interest to examine the effects of these variables through interpretation of the graph of the regression planes.

III. RESEARCH HYPOTHESIS#3

Research Hypothesis #3 considers the effect of source alone on belief in the message. It can be seen from the graph that that the four sources vary in terms of their effect on belief in the message. It appears as if the anti-food additive respondents (attitude score < 2.5) tended to believe the message more so if the source was the nutritionist.

For those who were undecided in their attitudes, (attitude score 3.5-4.5), the order of source effectiveness changes, with the food scientist resulting in slightly greater belief than the nutritionist, followed by the control, then the medical doctor.

Just beyond the midscore range, at approximately 4.5, the order again changes, with the food scientist > control > nutritionist > medical doctor. Again, just after the score reaches 5, indicative of more positive attitudes toward food additives, the order changes, with the food scientist resulting in greater belief in the message than the control, who was more effective than the medical doctor and the nutritionist falls to last place.

It should be noted that although the sources vary in their effect on belief in the message, the belief in the message score barely makes 4 on the scale. This indicates that the message was still not highly believed by some of the respondents. Indeed, the mean score for belief in the message was only 4.26 (Table XV).

IV. RESEARCH HYPOTHESIS #4

Research Hypothesis #4 considered the effect of attitude on belief in the message. From Figure II (see page 118), it appears that as the attitude score increases, so does belief in the message. This occurs for all sources, except the nutritionist. For the respondents who received the nutritionist as the source, belief in the message did not change appreciablly over the full range of attitude scores. Because the message is pro-food additives, it makes sense that those with similar viewpoints, that is with attitude scores indicating a positive predisposition toward food additives, would have a greater belief in the message.

V. PROPORTION OF VARIANCE INCREMENT

From Table X, the Porportion of Variance Increment
indicates the amount of the overall total variance that is
accounted for by each independent variable. It can be seen that
the covariate, belief in food additive statements,accounts for
the majority of the accountable variance: ie., 44.14% out of
49.23%, which is about 89%. Actually, this term (proportion of
variance increment) means the amount of variance a particular
variable accounts for, with all the preceeding variables
removed. Thus X2's porportion of variance increment means the
amount of variance acounted for by X2, with the amount for X1
removed from the equation. It is quite reasonable for the
covariate to account for this much variance as the sentiments
expressed in the statements are similar to the overall setiments
in the message. In addition, the same measurement scale was
used for the covariate and the dependent variable measure.

The attribute variable, attitude toward food additives,
accounted for only 2.16 % compared to the overall 49.23%. This
result may be due to the measure itself. For the attitude
measure to work properly, the statement on which the response is
based must be believable (Fishbein and Raven, 1967). From Table
XII, and Figure 3, it can be seen that 50.4% of respondents did
not believe the statements, ie. score < 3.5. When the
assertion beween the subject and the object is not believable,
the response is not based on the sentiments felt about the
statement. Instead, the response is focused on the subject of
the statement alone.

This does not seriously affect scoring of the positive statements, as respondents who are anti-food additive will still mark the unfavourable end of the scale and receive a low score, while pro-food additive respondents will mark the favourable end and receive a high score. This would not be the case for responses to the anti-food additive statements (See Appendix E, VI).

Another reason may be due to the overwhelming majority of respondents, 74.4%, receiving an attitude score of less than 4.5, indicating predominantly negative (<3.5) or undecided (3.51-4.5) attitudes (Table XIII, Figure 4). When most of the reponses on the attitude measure are similar, it is more difficult to explain that the belief in the message will fluctuate with attitude, since attitude remains fairly constant. Whereas, if there was a wide range of attitude scores, a fluctuation in scores may correlate with different levels of belief.

III. ANCILLARY RESULTS

I. FREQUENCY DISTRIBUTION OF SCORES

Although not directly part of the research design, it was felt that that some information about the frequency distribution of the scores would be relevant to interpretation of the multiple regression analysis. The distribution of mean scores for the covariate, belief in food additive statements; for the atttribute, atttitude toward food additives; and the dependent variable, belief in a pro-food additive message were tabulated

and the results presented in histograms. These results have been referred to previously in the discussion.

Table XII -
Mean Scores and Frequency of Response for the BELIEF MEASURE

	Statements											
	#1			#5			#6			Average		
Score	Freq.	%	Cum.%	Freq.	%	Cum.%	Freq.	%	Cum.%	Freq.	%	Cum.%
1	12	9.0	9.6	29	23.2	23.2	14	11.2	11.2	8	6.4	6.4
2	2	21.6	31.2	22	17.6	40.8	11	8.8	20.6	15	12.0	18.4
3	30	24.0	55.2	28	22.4	63.2	10	8.0	28.0	40	32.0	50.4
4	28	22.4	77.6	28	22.?	85.6	33	26.4	54.4	33	26.4	76.8
5	15	12.0	89.6	14	11.2	96.8	31	24.8	79.2	23	18.4	95.2
6	12	9.6	99.2	4	3.2	100	22	17.6	96.8	6	4.8	100
7	1	0.8	100	-	-	-	4	3.2	100	-	-	-
Mean score	3.376			2.904			4.104			3.528		

Figure 3 -
Histogram of Mean Response Scores for BELIEF in Pro-Statements

```
     Code
          I
      1.  I******** (8)
  (0.5-1.5)I
          I
      2.  I************** (15)
 (1.51-2.5)I
          I
      3.  I*************************************** (40)
 (2.51-3.5)I
          I
      4.  I******************************** (33)
 (3.51-4.5)I
          I
      5.  I********************* (23)
 (4.51-5.5)I
          I
      6.  I****** (6)
 (5.51-6.5)I
          I
      7.  I
 (6.51-7.0)I
          I
          I.........I.........I.........I.........I.........I
          0        10        20        30        40        50
          Frequency of Response
          (Numbers in brackets = frequency)
```
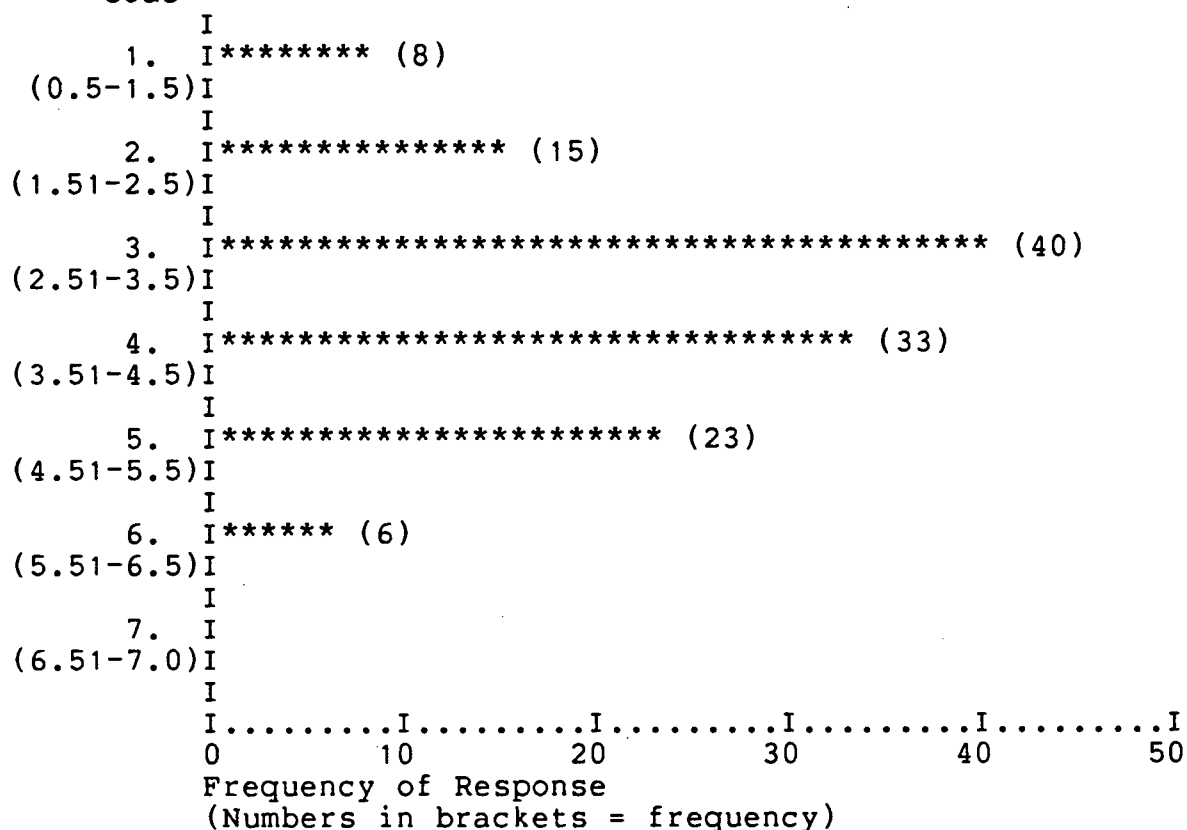
As can be seen from Table XII, the average score for belief in the pro-food additive statements (the covariate) was 3.53. This general lack of strong belief in the pro-food additive statements was illustrated in Figure 3 which showed the standard curve reached its maximum level at a belief score of 2.51-3.50.

Table XIII - Response Frequency of Mean ATTITUDE Scores

	#1			#5			#6			Average		
Code	Freq	%	Cum.%	Freq.	%	Cum.%	Freq.	%	Cum.%	Freq.	%	Cum.%
1	6	4.8	4.8	29	23.2	23.2	17	13.6	13.6	7	5.6	5.6
2	15	12.0	16.8	28	22.4	45.6	16	12.8	26.4	16	12.8	18.4
3	23	18.4	35.2	25	20.0	65.5	14	11.2	37.6	30	24.0	42.4
4	16	12.8	48.0	31	24.8	90.4	53	42.4	80.0	40	32.0	74.4
5	21	16.8	64.8	6	4.8	95.2	18	14.4	94.4	25	20.0	94.4
6	24	19.2	84.0	4	3.2	98.4	3	2.4	96.8	7	5.6	100
7	20	16.0	100	2	1.6	100	4	3.2	100	-	-	-
Mean Score		4.464			2.816			3.512			2.648	

Statements (header above table columns)

From Table XIII, the average mean attitude score was 2.65, indicating an overall negative attitude toward food additives. These results support previous surveys that measured attitudes toward food additives (Knox and Schreiber, 1980; Zibrik et al., 1981). Figure 4 showed that the responses were mostly on the negative or neutral portions of the graph.

```
        Figure  4 - Histogram of Mean ATTITUDE Scores
     Code
          I
     1.   I******* (7)
(0.5-1.5) I
          I
     2.   I*************** (16)
(1.51-2.5)I
          I
     3.   I***************************** (30)
(2.51-3.5)I
          I
     4.   I************************************** (40)
(3.51-4.5)I
          I
     5.   I************************* (25)
(4.51-5.5)I
          I
     6.   I******* (7)
(5.51-6.5)I
          I
     7.   I
(6.51-7.0)I
          I
          I........I........I........I........I........I
          0       10       20       30       40       50
          Frequency of Responses
          (Number in brackets = frequency)
```
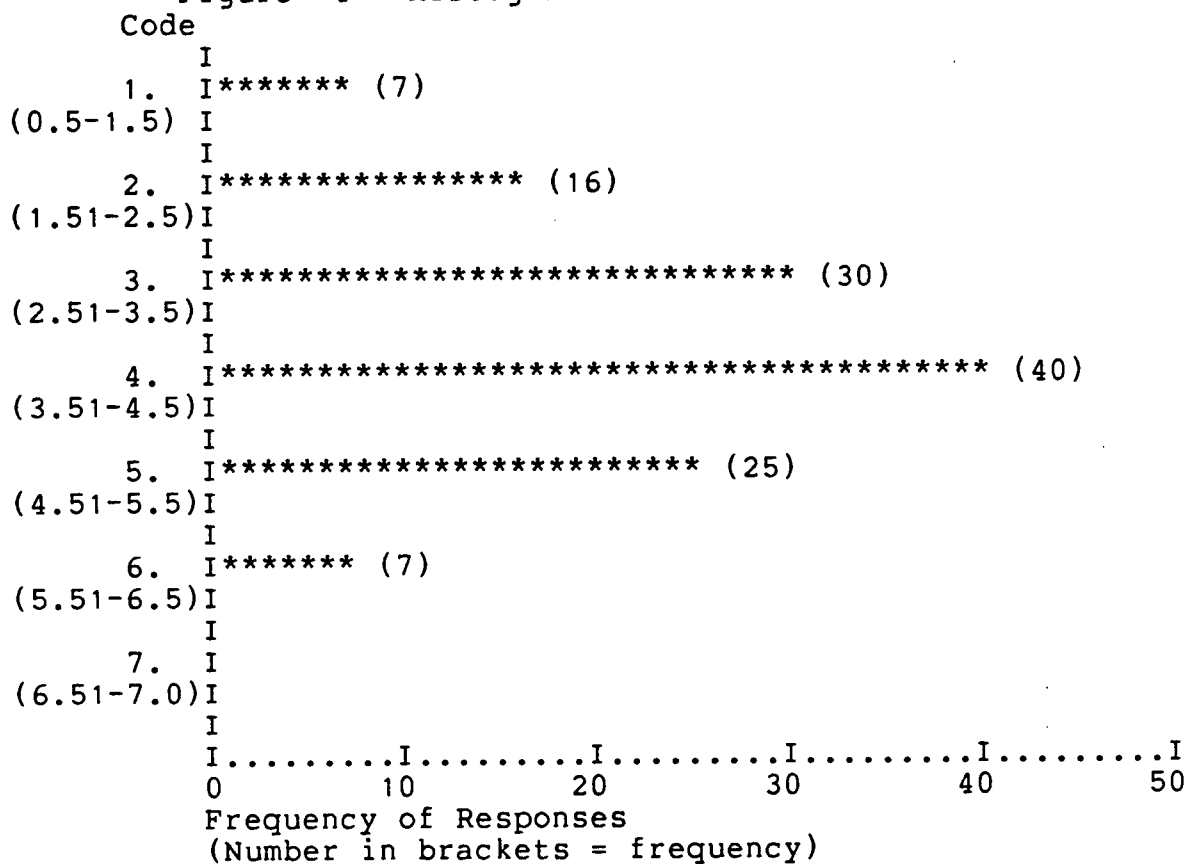
Table XIV -
Response Frequency of Mean MESSAGE BELIEF Scores

Code	Freq.	%	Cum.%
1	12	9.6	9.6
2	12	9.6	19.2
3	13	10.4	29.6
4	21	16.8	46.4
5	35	28.0	74.4
6	26	20.8	95.2
7	6	4.8	100
Mean Score	4.256		

From Table XIV, the mean score for belief in the pro-food additive message was 4.26, indicating that overall, belief in the message was undecided, or weak. A closer examination of the scores in Figure 5, shows that quite a large portion of respondents scored in the positive belief range (4.51-7.0). From Table XIV, these respondents represent 53.6% of all respondents.

Figure 5 - Histogram of Mean BELIEF in MESSAGE Scores

```
Code
          I
    1.    I*********** (12)
 (0.5-1.5)I
          I
    2.    I*********** (12)
(1.51-2.5)I
          I
    3.    I************ (13)
(2.51-3.5)I
          I
    4.    I******************* (21)
(3.51-4.5)I
          I
    5.    I********************************* (35)
(4.51-5.5)I
          I
    6.    I************************* (26)
(5.51-6.5)I
          I
    7.    I****** (6)
          I
          I
          I.........I.........I.........I.........I.........I
          0        10        20        30        40        50
          Frequency of Response
           (Number in brackets=frequency)
```
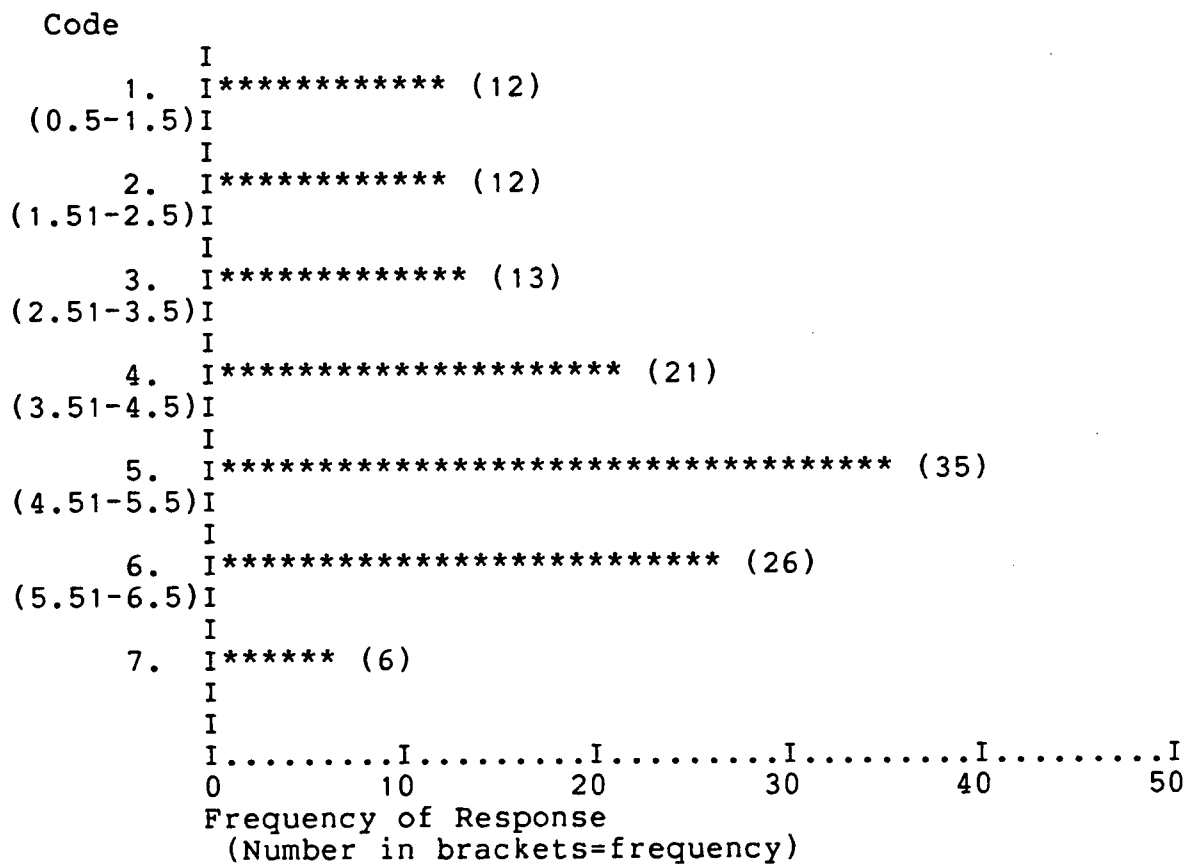
II.

MESSAGE BELIEF SCORES COMPARED BY SOURCE

Although not directly related to the research design, it was felt to be of interest to compare the actual mean belief in message scores for each source. these are listed in the Table XV.

Table XV - Mean Belief in Message Scores Grouped By Source

Source No.	Mean	Standard Deviation	Number in Group
1. Nutritionist	4.42	1.74	30
2. Food Scientist	4.39	1.53	32
3. Medical Doctor	4.18	1.46	33
4. Control	4.21	1.96	30
Overall	4.33	1.66	125

From this table it can be seen that the mean score for belief in the pro-food additive statement did not vary a great deal between the sources. This was expected for sources 1, 2 and 3, as all were previously rated as highly credible. However it is interesting to note that the control source , that is, no source at all, appeared to be as effective as the credible sources. Also, the mean belief scores were very close to 4,indicating that overall, respondents remained undecided about their belief in the pro-food additive message, regardless of the source.

In this vein, it was felt to be of interest to examine the actual scores for belief in the message, and how these scores varied for the sources over attiude ranges of anti, undecided and pro-food additive.

The mean attitude scores were groupd into three levels:

Level 1 (0-3.49)

Level 2 (3.50-4.50)

Level 3 (4.51-7.0)

The mean belief score was then determined for each attitude level, and for each source. The results are listed in Table XVI.

Table XVI - Belief in Message Over Three Attitude Levels

| Source | MEAN ATTITUDE SCORE | | | |
	Level 1 (0-3.49) Anti	Level2 (3.50-4.50) Neutral	Level3 (4.51-7.0) Pro	Overall
Nutritionist	3.94	4.80	4.75	4.42
Food Scientist	3.59	5.43	5.19	4.39
Medical Doctor	3.10	4.00	5.56	4.18
Control	2.63	5.27	5.61	4.21
Overall	3.36	4.73	5.29	4.30

These results were then graphed to give an overall picture of the actual mean scores of the sample, as shown in Figure 6. This was done because the treatment regression planes indicated that none of the sources resulted in an overall belief in the message, while, from the frequency histograms it was clear that some of the respondents did indeed believe the message. From the graph (Figure 6.), the trend towards greater belief in the

message as attitude becomes more positive can be seen.

Respondents with negative attitudes toward food additives tended not to believe the message. This was the same trend shown in the graph of regression planes. For the undecided respondents however, there is a more positive effect of the sources, with the control and food scientist causing greater belief than the medical doctor or control. But there is indeed an indication of belief in the message, i.e. a score greater than 4.5, which was not evident in the regression plane graph. And, people with positive attitudes towards food additives did indeed believe the pro-food additive message, whereas in Figure 2, this belief was not evident.

Therefore, some people actually believed the message, according to the mean scores. However, this graph (Figure 6) considers only three particular points out of all the data, which makes extrapolation to the general sample difficult. In addition, due to lack of subjects, it was not possible to statistically test the the significance of the difference between the four sources. The general assessment of the effects of source must be considered in light of the full regression model, Figure 2.

Figure 6 - Graph of Message Belief vs. Attitude Level

Level 1 (0 - 3.49)   Level 2 (3.50-4.50)   Level 3 (4.51-7.00)

Attitude Levels

(Unfavourable, Undecided, Favourable)
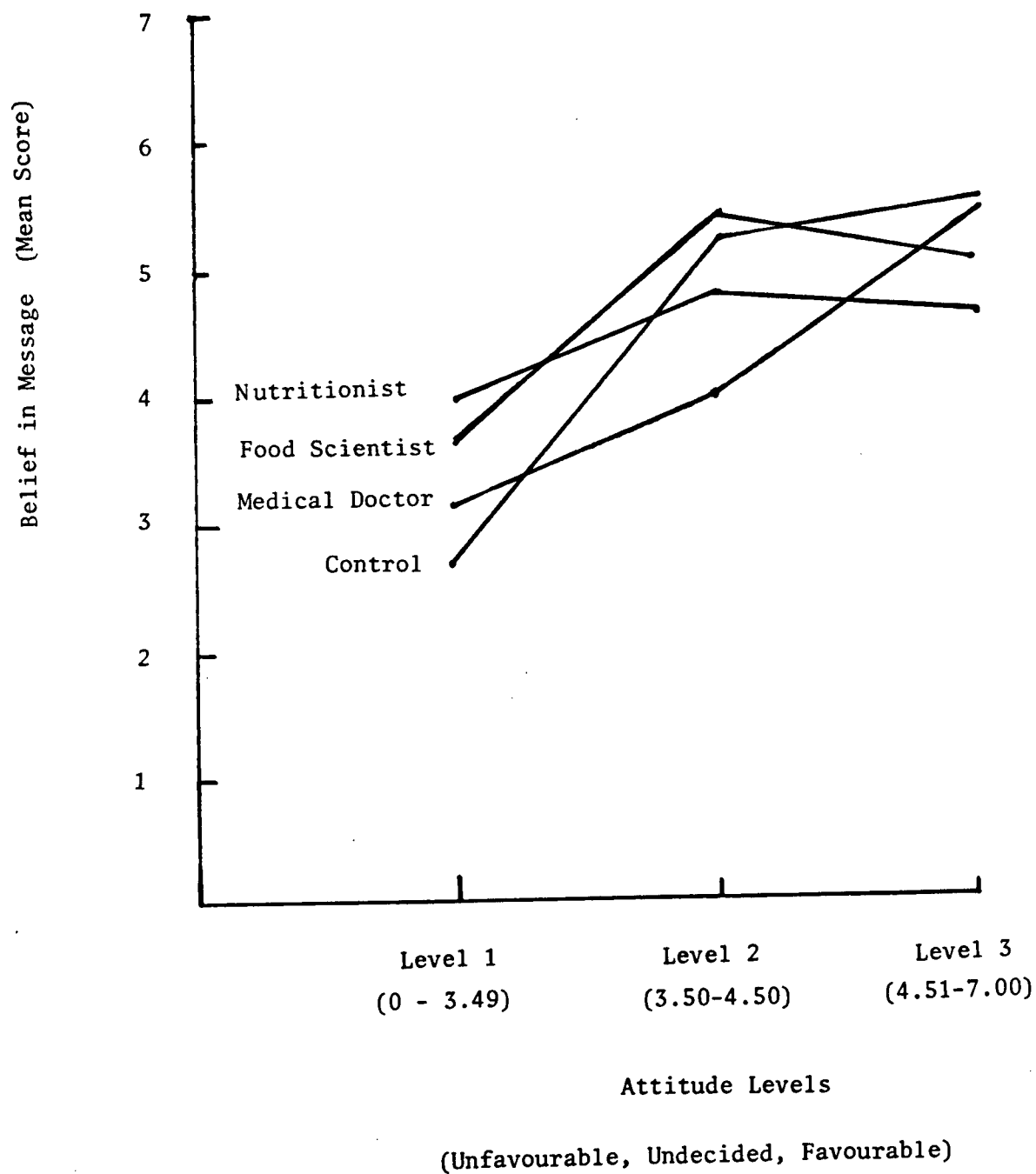
V. SUMMARY AND CONCLUSION

The results of this research supported surveys reported in the literature that found the presence of negative attitudes toward food additives. Of the respondents, 42.4% expressed negative attitudes toward food additives, while an additional 32% were undecided.

One of the general objectives of this research was to determine the more credible sources of information on food additives. A nutritionist, a food scientist and a medical doctor were rated the three most credible sources. However, this rating was completed by a small and perhaps biased sample, and a more generalized rating by the public is yet required.

In addition, other source-related factors, such as the medium with which the sources are associated would certainly influence the effectiveness of these sources in any public communication. This also remains to be examined.

The second and third general problems in counteracting misinformation about food additives were examined by determining whether or not the source of a pro-food additive message would influence belief in the message; and whether or not the attitude of the message receiver towards food additives would influence their belief in the pro-food additive message.

This research found a significant interaction effect between the source of the message and the attitude of the message receiver toward food additives. Of those respondents in the sample who held negative attitudes toward food additives, the nutritionist appeared to cause greater belief in the pro-

food additive message. For those who were undecided about food additives, the food scientist seemed slightly more effective than the other sources. An interesting result here was that the effect of the nutrtionist on belief in the message remained relatively constant, regardless of the attitude of the message receiver.

None of the sources were outstandingly superior to the other sources in their effect on belief in the message This was expected, as all three sources were previously rated as highly credible.

Although the effects of receiver attitude and message source were significant, these two variables did not contribute much to the overall accountable variance in belief in the message. This may have been due to the instrument used, or perhaps it indicates that other factors are more influential.

This study found that communicating a message that is contrary to popular beliefs about food additives remains somewhat of a problem, in spite of using highly credible sources of information. For people with negative attitudes toward food additives, none of the sources used in the study were influential enough to produce belief in the pro-food additive message.

Results from this research support Delaney and Maxwell (1980) in finding that the use of a covariate term (under certain constraints) in the regression model produced a significant attribute by treatment interaction. This interaction has been somewhat illusive in other models.

It is recommended that care be taken in the design of instruments measuring attitudes toward food additives. Statements that appear to be open to opinion, may be taken for fact, due to the effect of a stereotype image about food additives.

Also, the use of statements and measurement scales which have denotative characteristics must be avoided.

The question of what is the most effective way to counteract misinformation about food additives remains a difficult one to answer. There are many variables involved in the solution to this problem. This research has shed some light on two variables: the source of reliable information about food additives and the message receiver's attitude toward food additives. Much work remains to be investigated regarding the most effective means for countering misinformation, including such variables as message structure, type of media used, and level of involvement in the food additive issue. If credible sources are ineffetive at changing attitudes toward food additives, then perhaps other avenues within attitude change theory need to be explored.

APPENDIX A - PRE-SURVEY ONE

SOURCE CREDIBILITY

THIS SURVEY IS DESIGNED TO ASSESS THE APPLICATION OF SOURCE CREDIBILITY THEORY TO A SPECIFIC TOPIC. THE RESULTS OF YOUR PARTICIPATION WILL AID IN THE UNDERSTANDING OF THIS ASPECT OF COMMUNICATING SCIENTIFIC INFORMATION TO THE PUBLIC.

YOU ARE FREE TO WITHDRAW AT ANY TIME, OR TO REFUSE TO ANSWER ANY QUESTIONS WITHOUT PREJUDICE. REFUSAL TO PARTICIPATE WILL, IN NO WAY AFFECT CLASS STANDING. IF THE QUESTIONAIRE IS COMPLETED, IT WILL BE ASSUMED THAT CONSENT HAS BEEN GIVEN. PLEASE DO NOT SIGN YOUR NAME. THE TIME ALLOTTED IS FIFTEEN (15) MINUTES.

IN THE SURVEY, YOU ARE ASKED TO RATE SEVERAL SOURCES OF FOOD ADDITIVE INFORMATION BY RESPONDING ON A SEMANTIC DIFFERENTIAL SCALE. A FOOD ADDITIVE IS A SUBSTANCE ADDED INTENTIONALLY TO A FOOD THAT ALTERS THE CHARACTERISTICS OF THAT FOOD. FOR EXAMPLE, STABILIZERS, COLOURS AND PRESERVATIVES ARE FOOD ADDITIVES.

THERE HAS BEEN EXTENSIVE REPORTING OF FOOD ADDITIVE ISSUES IN THE MEDIA IN RECENT YEARS, PARTICULARLY THEIR EFFECTS ON HEALTH. PLEASE CONSIDER THESE SOURCES OF INFORMATION WHEN RESPONDING TO THE 'FREQUENCY OF USE' QUESTION THAT FOLLOWS EACH SET OF ADJECTIVE PAIRS.

THANK YOU FOR YOUR PARTICIPATION IN MY THESIS RESEARCH PROJECT.

SINCERELY,

Shelagh Campbell

SOURCE CREDIBILITY

INSTRUCTIONS

IN THIS SURVEY, A SOURCE WILL BE NAMED, FOLLOWED BY SIX ADJECTIVE PAIRS, AND A FREQUENCY OF USE QUESTION. YOU ARE REQUESTED TO CHOOSE THE ONE WORD FROM EACH ADJECTIVE PAIR THAT BEST DESCRIBES YOUR FEELINGS ABOUT THE SOURCE, AND THEN TO INDICATE HOW CLOSELY RELATED THE WORD IS TO YOUR FEELINGS. THIS IS INDICATED BY HOW CLOSELY "X" IS PLACED TO THE CHOSEN WORD.

FOR EXAMPLE, CONSIDER THE NAMED SOURCE. IS THIS SOURCE OF INFORMATION REGARDING FOOD ADDITIVES TRUSTWORTHY OR UNTRUSTWORTHY ?

A NEIGHBOR PROVIDING INFORMATION ABOUT FOOD ADDITIVES.

trustworthy ___ ___ X ___ ___ ___ untrustworthy
equally
---slightly-
----quite closely ----
--------very closely related---
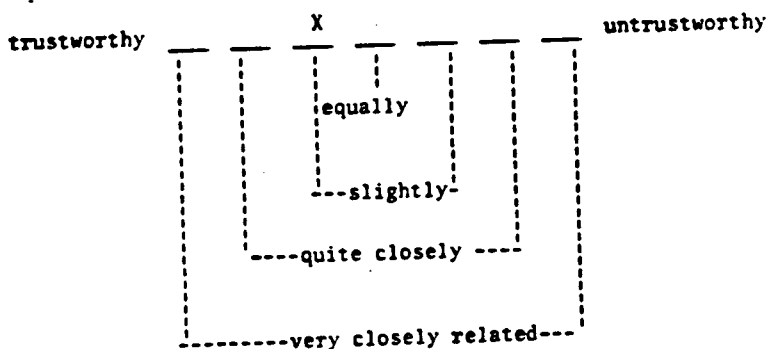
SAY, FOR THIS EXAMPLE, TRUSTWORTHY BEST DESCRIBES YOUR FEELINGS ABOUT THE SOURCE. NEXT, DECIDE IF THE SOURCE IS VERY TRUSTWORTHY, QUITE TRUSTWORTHY OR ONLY SLIGHTLY TRUSTWORTHY. IN THIS EXAMPLE, slightly trustworthy IS MARKED. IF THE SOURCE IS EQUALLY TRUSTWORTHY AND UNTRUSTWORTHY, THE CENTRE SPACE IS MARKED. PLEASE COMPLETE ALL SIX ADJECTIVE PAIRS AND THEN ANSWER THE QUESTION:

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL ___ ___ ___ X ___ ___ ___ NONE

PLEASE INDICATE THE APPROXIMATE POSITION ON THE SCALE BETWEEN "ALL" AND "NONE" THAT CORRESPONDS TO THE PORPORTION OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES THAT ORIGINATED FROM THIS SOURCE. THE MID SPACE MEANS THAT HALF OF WHAT HAS BEEN HEARD ABOUT FOOD ADDITIVES COMES FROM THIS SOURCE.

MEDICAL DOCTOR PROVIDING INFORMATION ABOUT FOOD ADDITIVES.

(A DOCTOR WITH A RECOGNIZED MEDICAL DEGREE)

COMPETENT	__ __ __ __ __ __ __	INCOMPETENT
INEXPERIENCED	__ __ __ __ __ __ __	EXPERIENCED
DISHONEST	__ __ __ __ __ __ __	HONEST
TRUSTWORTHY	__ __ __ __ __ __ __	UNTRUSTWORTHY
UNSYMPATHETIC	__ __ __ __ __ __ __	SYMPATHETIC
TRAINED	__ __ __ __ __ __ __	UNTRAINED

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL   __ __ __ __ __ __ __   NONE

A FOOD SCIENTIST PROVIDING INFORMATION ABOUT FOOD ADDITIVES

(A PERSON WITH A SCIENCE DEGREE IN THE CHEMISTRY OF FOOD AND FOOD PROCESSING)

COMPETENT	__ __ __ __ __ __ __	INCOMPETENT
INEXPERIENCED	__ __ __ __ __ __ __	EXPERIENCED
DISHONEST	__ __ __ __ __ __ __	HONEST
TRUSTWORTHY	__ __ __ __ __ __ __	UNTRUSTWORTHY
UNSYMPATHETIC	__ __ __ __ __ __ __	SYMPATHETIC
TRAINED	__ __ __ __ __ __ __	UNTRAINED

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL   __ __ __ __ __ __ __   NONE

A CONSUMER REPORTER PROVIDING INFORMATION ABOUT FOOD ADDITIVES

(A JOURNALIST WHO SPECIALIZES IN AREAS OF INTEREST TO CONSUMERS)

COMPETENT __ __ __ __ __ __ __ INCOMPETENT

INEXPERIENCED __ __ __ __ __ __ __ EXPERIENCED

DISHONEST __ __ __ __ __ __ __ HONEST

TRUSTWORTHY __ __ __ __ __ __ __ UNTRUSTWORTHY

UNSYMPATHETIC __ __ __ __ __ __ __ SYMPATHETIC

TRAINED __ __ __ __ __ __ __ UNTRAINED

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL __ __ __ __ __ __ __ NONE

A GOVERNMENT SPOKESMAN PROVIDING INFORMATION ABOUT FOOD ADDITIVES

(A PERSON REPRESENTING A GOVERNMENT DEPARTMENT, WHOSE JOB IS TO PROVIDE INFORMATION TO THE PUBLIC)

COMPETENT __ __ __ __ __ __ __ INCOMPETENT

INEXPERIENCED __ __ __ __ __ __ __ EXPERIENCED

DISHONEST __ __ __ __ __ __ __ HONEST

TRUSTWORTHY __ __ __ __ __ __ __ UNTRUSTWORTHY

UNSYMPATHETIC __ __ __ __ __ __ __ SYMPATHETIC

TRAINED __ __ __ __ __ __ __ UNTRAINED

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL __ __ __ __ __ __ __ NONE

AN ANNONYMOUS REPORTER PROVIDING INFORMATION ABOUT FOOD ADDITIVES

(THE REPORTER IS FROM A FIELD NEWS SERVICE, BUT NOT NAMED)

COMPETENT   __ __ __ __ __ __ __   INCOMPETENT

INEXPERIENCED __ __ __ __ __ __ __   EXPERIENCED

DISHONEST   __ __ __ __ __ __ __   HONEST

TRUSTWORTHY   __ __ __ __ __ __ __   UNTRUSTWORTHY

UNSYMPATHETIC   __ __ __ __ __ __   SYMPATHETIC

TRAINED   __ __ __ __ __ __ __   UNTRAINED

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL   __ __ __ __ __ __ __   NONE

A NUTRITIONIST PROVIDING INFORMATION ABOUT FOOD ADDITIVES

(A PERSON WITH A SCIENCE DEGREE IN THE UTILIZATION OF FOOD NUTRIENTS BY THE HUMAN BODY)

COMPETENT   __ __ __ __ __ __ __   INCOMPETENT

INEXPERIENCED __ __ __ __ __ __ __   EXPERIENCED

DISHONEST   __ __ __ __ __ __ __   HONEST

TRUSTWORTHY   __ __ __ __ __ __ __   UNTRUSTWORTHY

UNSYMPATHETIC   __ __ __ __ __ __ __   SYMPATHETIC

TRAINED   __ __ __ __ __ __ __   UNTRAINED

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL   __ __ __ __ __ __ __   NONE

A <u>HEALTH FOOD ADVOCATE</u> PROVIDING INFORMATION ON FOOD ADDITIVES

(A PERSON WHO PROMOTES ADDITIVE-FREE, UNREFINED FOODS)

COMPETENT   __ __ __ __ __ __ __   INCOMPETENT

INEXPERIENCED __ __ __ __ __ __ __   EXPERIENCED

DISHONEST   __ __ __ __ __ __ __   HONEST

TRUSTWORTHY __ __ __ __ __ __ __   UNTRUSTWORTHY

UNSYMPATHETIC __ __ __ __ __ __ __   SYMPATHETIC

TRAINED   __ __ __ __ __ __ __   UNTRAINED

HOW MUCH OF WHAT YOU HAVE HEARD ABOUT FOOD ADDITIVES CAME FROM THIS SOURCE ?

ALL   __ __ __ __ __ __ __   NONE

APPENDIX B - PRE-SURVEY TWO

THESIS RESEARCH - Pre-survey   May 7,1982

        The prupose of this exercise is to dertermine the relative
positions of a series of statements; in other words, how STRONGLY NEGATIVE
or how STRONGLY POSITIVE the statements are.

        Please DO NOT consider the truthfulness, or whether or not you
agree or disagree with the statements. There are no right or wrong responses

        The scale on which the statement is rated has a range of 7 points.
Please indicate only one point in response to the statement on the card.

                                                        X

        ___   ___   ___   ___   ___   ___   ___

    very stronly   neutral   very strongl
    negative   positive

            quite   quite
            negative   positive

                    slightly   slightly
                    negative   positive
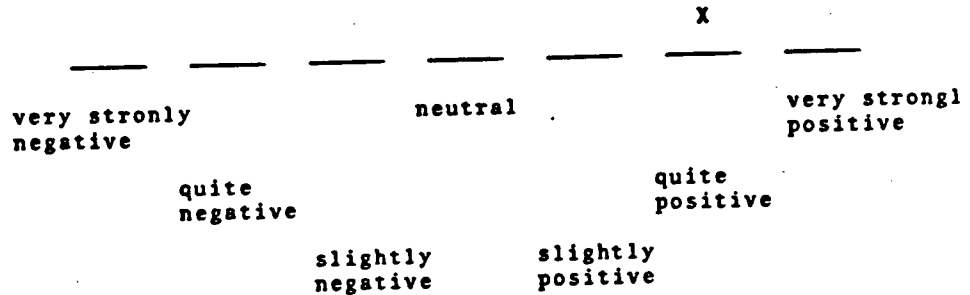
For example, if you felt that   "Food additives make people happy" was
quite a positive statement, mark the X in the corresponding point.

CARD NUMBER

1.   ___   ___   ___   ___   ___   ___   ___

2.   ___   ___   ___   ___   ___   ___   ___

3.   ___   ___   ___   ___   ___   ___   ___

4.   ___   ___   ___   ___   ___   ___   ___

5.   ___   ___   ___   ___   ___   ___   ___

6.   ___   ___   ___   ___   ___   ___   ___

7.   ___   ___   ___   ___   ___   ___   ___

8.   ___   ___   ___   ___   ___   ___   ___

9.   ___   ___   ___   ___   ___   ___   ___

10. ___ ___ ___ ___ ___ ___ ___

11. ___ ___ ___ ___ ___ ___ ___

12. ___ ___ ___ ___ ___ ___ ___

13. ___ ___ ___ ___ ___ ___ ___

14. ___ ___ ___ ___ ___ ___ ___

15. ___ ___ ___ ___ ___ ___ ___

16. ___ ___ ___ ___ ___ ___ ___

17. ___ ___ ___ ___ ___ ___ ___

18. ___ ___ ___ ___ ___ ___ ___

19. ___ ___ ___ ___ ___ ___ ___

20. ___ ___ ___ ___ ___ ___ ___

21. ___ ___ ___ ___ ___ ___ ___

22. ___ ___ ___ ___ ___ ___ ___

APPENDIX C - THE MAIN SURVEY

SOURCE CREDIBILITY

This questionaire is designed to assess the application of source credibility theory to a specific topic. The results of your participation will aid in the understanding of this aspect of communicating scientific research to the public.

There are three parts to the questionaire :

Part 1   Your Opinions

Part 2   The Message

Part 3   Your Reaction to the Message.

In Part 1, you are requested to judge a series of statements and respond on the scale provided. There are no right or wrong answers. In Part 2, just read the brief message, keeping in mind the WRITER of the message. In Part 3, the investigator is interested in your reaction to the message. A scale is provided for your response.

Fifteen minutes are allotted for this survey. You are free to withdraw at any time or refuse to answer any questions without prejudice. If the questionaire is completed, it will be assumed that consent has been given. Please do not sign your name. Refusal to participate will in no way affect class standing.

Thank you for your participation in my thesis research project.

Sincerely,

Shelagh Campbell

PART 1

YOUR OPINION

Please indicate your feelings about the statement by placing an "X" on the scale between pairs of adjectives. Your should place one "X" between each pair of words according to how closely related your feelings are to that word. Choose which of the two words in the adjective pair best describe your feelings. Then, decide if your feelings are very closely related to this word, quite closely , or only slightly related. If your feelings are equally related to both words, mark the centre space. For example :

FOOD ADDITIVES PROTECT FOOD FROM SPOILAGE.

IMPROBABLE ___ ___ ___ ___ X ___ PROBABLE

equally

---slightly----

-quite closely------------

---very closely related------------
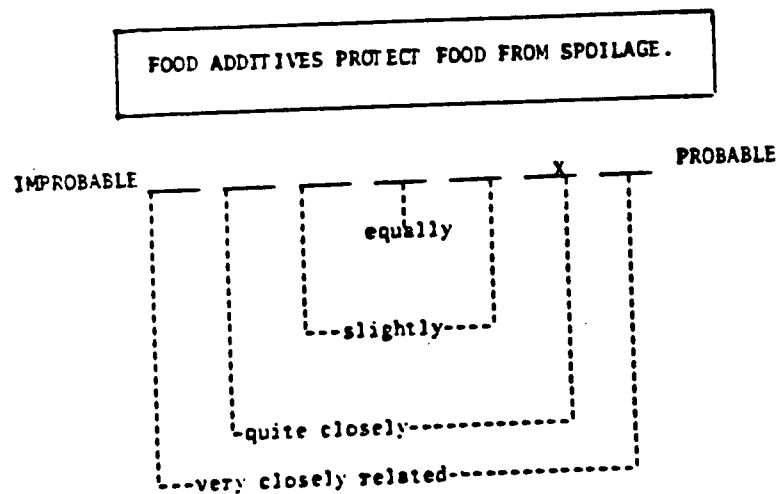
The "X" placed as above indicates that the respondent feels the statement is quite probable.

FOOD ADDITIVES ARE ADEQUATELY CONTROLLED

LIKELY — — — — — — — UNLIKELY

IMPROBABLE — — — — — — — PROBABLE

TRUE — — — — — — — FALSE

IMPOSSIBLE — — — — — — — POSSIBLE

WISE — — — — — — — FOOLISH

GOOD — — — — — — — BAD

SICK — — — — — — — HEALTHY

BENIFICIAL — — — — — — — HARMFUL

FOOD ADDITIVES DISGUISE INFERIOR PRODUCTS

LIKELY — — — — — — — UNLIKELY

IMPROBABLE — — — — — — — PROBABLE

TRUE — — — — — — — FALSE

IMPOSSIBLE — — — — — — — POSSIBLE

WISE — — — — — — — FOOLISH

GOOD — — — — — — — BAD

SICK — — — — — — — HEALTHY

BENEFICIAL — — — — — — — HARMFUL

FOOD ADDITIVES ARE A SERIOUS RISK TO HEALTH

LIKELY   — — — — — — —   UNLIKELY

IMPROBABLE — — — — — — —   PROBABLE

TRUE   — — — — — — —   FALSE

IMPOSSIBLE   — — — — — — —   POSSIBLE

WISE   — — — — — — —   FOOLISH

GOOD   — — — — — — —   BAD

SICK   — — — — — — —   HEALTHY

BENEFICIAL — — — — — — —   HARMFUL

FOOD ADDITIVES CAUSE CANCER

LIKELY   — — — — — — —   UNLIKELY

IMPROBABLE — — — — — — —   PROBABLE

TRUE   — — — — — — —   FALSE

IMPOSSIBLE   — — — — — — —   POSSIBLE

WISE   — — — — — — —   FOOLISH

GOOD   — — — — — — —   BAD

SICK   — — — — — — —   HEALTHY

BENEFICIAL — — — — — — —   HARMFUL

FOOD ADDITIVES ARE HARMLESS

LIKELY ___ ___ ___ ___ ___ ___ ___ UNLIKELY

IMPROBABLE ___ ___ ___ ___ ___ ___ ___ PROBABLE

TRUE ___ ___ ___ ___ ___ ___ ___ FALSE

IMPOSSIBLE ___ ___ ___ ___ ___ ___ ___ POSSIBLE

WISE ___ ___ ___ ___ ___ ___ ___ FOOLISH

GOOD ___ ___ ___ ___ ___ ___ ___ BAD

SICK ___ ___ ___ ___ ___ ___ ___ HEALTHY

BENEFICIAL ___ ___ ___ ___ ___ ___ ___ HARMFUL

FOOD ADDITIVES ARE NECESSARY IN FOOD

LIKELY ___ ___ ___ ___ ___ ___ ___ UNLIKELY

IMPROBABLE ___ ___ ___ ___ ___ ___ ___ PROBABLE

TRUE ___ ___ ___ ___ ___ ___ ___ FALSE

IMPOSSIBLE ___ ___ ___ ___ ___ ___ ___ POSSIBLE

WISE ___ ___ ___ ___ ___ ___ ___ FOOLISH

GOOD ___ ___ ___ ___ ___ ___ ___ BAD

SICK ___ ___ ___ ___ ___ ___ ___ HEALTHY

BENEFICIAL ___ ___ ___ ___ ___ ___ ___ HARMFUL

PART 2   THE MESSAGE

Please read the following message:

Additive panic unfounded

With the barrage of information and conflicting advice coming at us these days, it's easy to become uncertain about the food we eat. Understanding the ingredients on most food labels seems to require a degree in chemistry. Yet the risk from these difficult to pronounce chemical additives has been greatly exaggerated.

According to Dr. Robert Bruce, Head of the Ludwig Institute for Cancer Research in Toronto, "Studies indicate that 70-75% percent of female cancers are related to dietary habits. By comparison, radiation, drugs, food additives and occupational hazards are minor causes".

And, Dr. Elizabeth Whelan, Executive Director of the American Council on Science and Health goes even further: "There is not one single case on record of any human death related to the consumption of food additives."

So, why all the worry? When some additives have become suspect or actually banned, we've naturally overreacted and become negative on almost all additives. In fact, we've forgotten about the benefits – benefits that mean enough food for large urban populations that demand a wide variety of consistently high quality, safe nutritious and convenient foods.

In addition, our concerns about food are exploited by the media who frequently paint a very one-sided picture. The fact that additives are rigorously tested and strictly controlled by law – the Food and Drugs Act and Regulations – is rather dull information compared to the frightening scare stories that appear in newspapers and magazines.

Even food manufacturers themselves have caused confusion by removing harmless additives in order to sell "additive-free" products. More than a few companies, for instance have stopped adding propionate to their bread. But, in fact, propionate is a safe substance that's naturally present (at even higher levels) in Swiss cheese. It retards the growth of harmful moulds on bread.

The one basic ingredient that seems to be missing from many food additive issues is common sense. It's too bad, for without all the ingredients, the concerns end up half baked.

John Johnston

(Editors note: John Johnston is a nutritionist)

PART 3

YOUR REACTION TO THE MESSAGE

After reading the message, please indicate your reaction to the information, keeping in mind the source of the message. Again there are pairs of adjectives and you are requested to choose the one word from each pair that best describes your reaction, and then to indicate how closely related the word is to your reaction. This is indicated by how closely the "X" is placed to the chosen word. For example, consider the information presented in the message. Was it possible or impossible ?

```
possible ___   X  ___  ___  ___  ___  ___ ___ impossible
          :    :    :    :    :    :    :    :
          :    :    :  equally :   :    :    :
          :    :    :    :    :    :    :    :
          :    :    L--slightly---J    :    :
          :    :              :    :
          :    L-----quite closely ------J    :
          :                        :
          L------very closely related------------'
```

Say, for this example, "possible" best describes your reaction to the information presented in a message. Next, decide if it is very possible, quite possible, or slightly possible. In this example "quite possible" is marked. If the information presented is equally possible and impossible, the centre space is marked.

Please complete all eight adjective pairs. Again, there are no right or wrong answers.

PART 3   <u>YOUR REACTION TO THE MESSAGE</u>

What is your reaction to the information in the message ?

Place an "X" in the appropriate space for each adjective pair.

LIKELY   ___ ___ ___ ___ ___ ___ ___ UNLIKELY

IMPROBABLE ___ ___ ___ ___ ___ ___ ___ PROBABLE

POSSIBLE   ___ ___ ___ ___ ___ ___ ___ IMPOSSIBLE

FALSE   ___ ___ ___ ___ ___ ___ ___ TRUE

DISAGREE   ___ ___ ___ ___ ___ ___ ___ AGREE

THANK YOU, THE QUESTIONAIRE IS NOW COMPLETED.

LEAVES 145 to 147 DUPLICATES OF PAGE 142.

PART 2   THE MESSAGE

Please read the following message:

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So, why all the worry? When some additives have become suspect or actually banned, we've naturally overreacted and become negative on almost all additives. In fact, we've forgotten about the benefits - benefits that mean enough food for large urban populations that demand a wide variety of consistently high quality, safe nutritious and convenient foods.

In addition, our concerns about food are exploited by the media who frequently paint a very one-sided picture. The fact that additives are rigorously tested and strictly controlled by law - the Food and Drugs Act and Regulations - is rather dull information compared to the frightening scare stories that appear in newspapers and magazines.

Even food manufacturers themselves have caused confusion by removing harmless additives in order to sell "additive-free" products. More than a few companies, for instance have stopped adding propionate to their bread.But, in fact, propionate is a safe substance that's naturally present (at even higher levels) in Swiss cheese. It retards the growth of harmful moulds on bread.

The one basic ingredient that seems to be missing from many food additive issues is common sense. It's too bad, for without all the ingredients, the concerns end up half baked.

John Johnston

(Editors note: John Johnston is a medical doctor)

PART 2   THE MESSAGE

Please read the following message:

Additive panic unfounded

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John Johnston

(Editors note: John Johnston is a food scientist)

PART 2   THE MESSAGE

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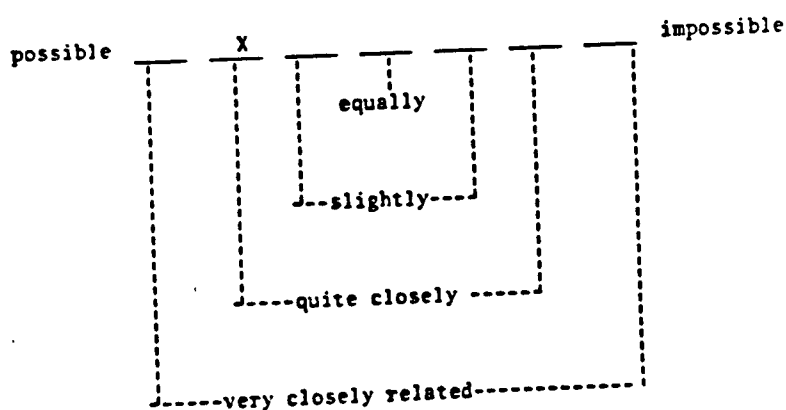
The one basic ingredient that seems to be missing from many food additive issues is common sense. It's too bad, for without all the ingredients, the concerns end up half baked.

APPENDIX D - DEVELOPMENT OF THE SURVEY INSTRUMENTS

I. PRESURVEY 1 - RATING OF SOURCES

Table XVII - RATING OF SOURCES - ITEM STATISTICS

	Mean Score Per Item												
	Competence						Character						
SOURCE	1		2		3		4		5		6		Tot.
	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M
M.D.	5.2	1.2	5.0	1.3	5.9	1.0	5.5	1.0	4.8	1.1	5.1	1.5	5.3
F.S.	6.3	0.7	6.1	1.2	5.8	1.0	5.6	1.1	4.9	1.2	6.2	1.1	5.8
C.R.	4.7	1.3	4.6	1.3	5.2	1.3	4.9	1.4	4.7	1.5	4.0	1.6	4.7
G.S.	4.6	1.2	4.6	1.8	4.2	1.0	4.1	1.3	3.8	1.2	4.2	1.6	4.3
A.R.	3.2	1.0	3.5	1.2	4.2	0.7	3.6	1.1	4.3	1.0	3.3	1.4	3.7
Nutr	6.3	0.7	6.1	1.1	5.9	1.2	5.7	1.2	5.6	1.3	6.1	1.2	5.9
H.F.	3.9	1.2	4.4	1.1	4.6	1.0	3.9	0.9	5.1	1.4	2.8	1.3	4.1

(M = mean, S.D.= Standard Deviation, Tot.= Overall mean score)
  Where:
         M.D. = Medical Doctor
         F.S. = Food Scientist
         C.R. = Consumer Reporter
         G.S. = Government Spokesman
         A.R. = Annonymous Reporter
         Nutr.= Nutritionist
         H.F. = Health Food Advocate

Table XV11 povides further details about the credibility raings of the sources. The term 'item' refers to the adjective pair used to rate credibility. Three adjctive pairs are used for competence and three for character. It can be seen that the mean score for each item tends to highest for the nutritionist, the food scientist and the medical doctor (the chosen sources). It is interesting to note that the health food advocate was rated second overall under the charater measure trustworthy/untrustworthy.

Table XVIII - Subtest Statistics - Source of Variance

	INDIVIDUAL	ITEM	RESIDUAL	TOTAL
DEGREES OF FREEDOM	21	5	105	131
SUMS OF SQUARES				
Medical Doctor	106.24	15.24	70.76	192.24
Food Scientist	50.64	28.28	88.18	167.64
Consumer Reporter	147.16	1.95	95.89	260.99
Government Spokesperson	56.24	7.88	142.12	206.24
Annonymous Reporter	72.97	21.28	77.85	172.64
Nutritionist	66.52	7.34	87.69	161.52
Health Food Advocate	47.52	65.24	115.76	228.52
MEAN SQUARES				
Medical Doctor	5.06	3.05	0.67	1.47
Food Scientist	2.41	5.76	0.84	1.28
Consumer Reporter	7.01	3.59	0.91	1.99
Government Spokesperson	2.68	1.58	1.35	1.57
Annonymous Reporter	3.47	4.36	0.74	1.32
Nutritionist	3.17	1.47	0.83	1.23
Health Food Advocate	2.26	13.05	1.10	1.74

II. SCORING THE ATTITUDE MEASURE

In the Fishbein-Raven (1967) attitude/belief measure, the subject is asked to respond to a series of statements by indicating the adjective in each pair that is most closely related to his or her feelings evoked by the statement.

The theoretical response to the statement is outlined by Fishbein and Ajzen (1975). The statement consists of a subject (X), connected by an assertion, (---------->), to an object (Y). The end response to the statement depends on the individual's feelings toward each of the three parts of the statement. This assumes that the statement itself is believable. (Fishbein and Raven, 1967)

For example, the following assertions connect objects and subjects, and result in the responses given:

```
1)      +        +        -                        X
        X    ------->  Y          good - - - - - - bad
    Food additives   are      bad.
```

```
2)       -       +        -                 X
        X    -------->  Y         good - - - - - - bad
    Food additives   are      bad.
```

```
3)       +       +        +                 X
        X    -------->  Y         good - - - - - - bad
    Food additives    are    harmless.
```

```
4)       -       +        +                        X
        X    --------->  Y        good - - - - - - bad
    Food additives     are      harmless.
```

If, as in 1), I feel favourably toward the subject, food additives, which is connected by a positive assertion to an abject about which I am unfavourable, there is incongruity between the subject and object . The expected response in this example is to mark an unfavourable position ie 'bad'.

In 2), I feel unfavourable toward food additives, which is conected to an object toward which I am also unfavourable, there is no incongruity. Hence the overall reaction to the statement is favourable, and the response is 'good'. (The favourable end of the scale.)

In 3), the respondant is favourable toward food additives, as well as the object, harmless. The statement is congruent, and the overall response is favourable and the favourable end of the scale ismarked ie, 'good'.

In statement 4), the example shows the respondant to be unfavourable toward food additives, but it is connected to an object toward which respondant is favourable. This state of imbalance or incongruity results in an overall unfavourable response to the statement, and the 'bad' end of the scale is marked.

Fishbein and Ajzen state that scoring is conducted by awarding 7 to the place closest to the favourable adjective pair, and 1 to the place closest to the unfavourable adjective. Thus:

good <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> 2 1 bad

healthy <u>7</u> <u>6</u> <u>5</u> <u>4</u> <u>3</u> 2 1 sick

wise <u>7</u> <u>6</u> <u>5</u> <u>4</u> 3 2 1 foolish

benificial <u>7</u> <u>6</u> <u>5</u> <u>4</u> 3 2 1 harmful

In the four example statements above, a high attitude score indicates a positive attitude toward food additives, while a low score indicates a negative attitude toward food additives.

Responses to negative statements about food additives can be predicted from this theory. If the respondant is favourable towards food additives, responses should result in a high attitude score. The imbalance of the statement results in marking the unfavourable end of the scale, but, a score of 7 is awarded as as the respondent is favourable toward food additives. (1)

```
              +         +          -
              X ------------> Y
        Food additives    are    bad

              1 2 3 4 5 6 7
                          X
        wise - - - - - - foolish
                          X
        good - - - - - - bad
                          X
     healthy - - - - - - sick
                          X
   benificial - - - - - - harmful
```
(2)

Or, if the respondant is unfavourable toward food additives, the response should result in a low attitude score. The statement is in balance however, and the favourable end of the scale is marked. But, in this case a score of 1 is awarded for the favourable side.

```
              -         +          -
              X ------------> Y
        Food additives   are    bad

              1 2 3 4 5 6 7
              X
```

```
          wise - - - - - - foolish
               X
          good - - - - - - bad
               X
       healthy  - - - - - - sick
               X
    benificial - - - - - - harmful
```

And, for the positive statements, the scoring is reversed in order to maintain that a respondant favourable towards food additives receives a high score, while one who is unfavourable receives a low score. A respondant who is favourable towards food additives, is expected to produce an overall high attitude score. The statement is in balance and the favourable end of the scale is indicated, receiving a score of 7.

```
            +         +         +
            X ------------>  Y
      Food additives    are     harmless
```

```
          7 6 5 4 3 2 1
          X
     wise - - - - - - foolish
          X
     good - - - - - - bad
          X
  healthy  - - - - - - sick
          X
benificial - - - - - - harmful
```

If the respondant is unfavourable toward food additives, an overall low attitude score is expected. The statement is not in balance and the unfavourable end of the scale is marked. The unfavourable side thus receives a score of 1.

```
            -         +         +
            X ------------>  Y
      Food additives    are     harmless
```

```
          7 6 5 4 3 2 1
                      X
     wise - - - - - - foolish
                      X
     good - - - - - - bad
                      X
  healthy  - - - - - - sick
                      X
```

```
                 benificial - - - - - - - harmful
```

Therefore, the scoring of the attitude measure is reversed for the positive and negative statements. More precisely, for the positive statements:

6. Food additives are necessary.;

5. Food additives are harmless.;

1. Food additives are adequately controlled.;

the scale is scored as in examples 3) and 4) above:

```
                  +         +              +
              X ------------>  Y
         Food additives   are    harmless
```

```
                     7 6 5 4 3 2 1
         benificial - - - - - - - harmful

          healthy - - - - - - - sick

            good - - - - - - - bad

            wise - - - - - - - foolish
```

For the negative statements:

2) Food additives disguise inferior products.;

3) Food additives are a serious risk. ;

4) Food additives cause cancer. ;

the scale is reversed, as in examples 1) and 2) above.

```
                  -         +              -
              X ------------>  Y
         Food additives   are    bad
```

```
                   1 2 3 4 5 6 7
         benificial - - - - - - - harmful

          healthy - - - - - - - sick

            good - - - - - - - bad

            wise - - - - - - - foolish
```

APPENDIX E - THE INSTRUMENT - ANALYSIS OF RELIABILITY

III. STEPS IN INSTRUMENT DEVELOPMENT

The following is an assessment of the reliability testing of the scales that were used to measure attitude and belief in the Main Survey. It is important to test for reliability to ensure that the measurement instruments are not contributing to error in the results. Ideally all accountable variance should be due to individual differences in the subjects.

The LERTAP (Laboratory of Education Research Tests Analysis Package) computer program generated statistics that compared the correlation of each item (adjective pair) with the other items for each statement (sub test) and with the overall measure of six statements that comprized the complete test. From this any items or statements that were different from the others could be observed. In addition, the HOYT Reliability Coefficient was calcualted for each statement and for the overall test. The Hoyt Reliability Coefficient is based on the true variance plus variance due to items divided by true variance plus unaccounted for variance.

Mean Square Items (MSI) was also considered in the reliability assessment of the measurement instruments. MSI is an indication of the amount of variance that is due to items in the test. This figure should be low in comparison to the mean squares for individuals and residual error. When MSI was relatively high, indicating that the items were causing some problem, the test was examined for potential improvements.

The assessment is outlined in steps in an attempt to

simplify the procedures.

Step 1a: The attitude scale, using the complete test (all six statements yielded a good Hoyt (.87), but, in the ANOVA, a very high mean square items (113.32) resulted (Table XX1).

Step1b: For the belief scale, an unacceptable Hoyt (.58) and a very high mean square items in the ANOVA resulted (Table XXIII).

Step 2a: It appeared as if Item 1 on the attitude measure for the negative statements was consistently low (see Table XX). So, in an attempt to improve the reliability of the instrument, item 1 was removed from the calculation of the scores. This resulted in little improvment, with Hoyt dropping to .85, and mean square items increasing to 125.33 (Table XXIV).

Step 2b: On the belief measure, it appeared that Item 4 for the positive statements was consistently higher than the other items (see Table XXII). Therefore, in another attempt to improve the reliablity, Item4 was removed from the calaculations of Belief (X4), based on the scores for the pro-food additive statements only. Result showed that Hoyt did not improve (.46), nor did mean square items (140.96) (Table XXVII).

Step 3: From Tables XX and XXII, it can be seen that the mean square items seemed to differ depending on whether the statement was pro-food additive or anti-food additive. For example:

	Attitude Score			Belief Score		
	Mean	Mean Square	Items	Mean	Mean Square	Items
Positive						
1	4.574	5.25		3.50	59.34	
5	2.916	1.22		3.014	40.57	
6	3.636	0.75		4.190	11.79	
Negative						
2	5.400	16.39		5.296	10.53	
3	4.756	53.46		5.459	11.94	
4	5.014	74.15		5.286	15.93	

Therefore, in an attempt to improve the reliability of the test, the measure was split into two parts: the Pro-Food Additive Statements and the Anti-Food Additive Statements. As can be seen in Tables XXVIX, XXXI, Hoyts improve for both the attitude measure (.90) and the Belief measure (.88) for the pro statements. For the anti-statements, as shown in Tables XXXIII and XXXV, the Hoyt Reliability Coefficients again improved to 0.89 for belief and 0.83 for attitude. The mean square items also improves to 64.81 for Attitude, and 62.18 for Belief measure.

Step 4a: From Table XXX, it can be seen that for the positive statements, item4 on the belief measure has consistently higher mean scores that the other items in the subtest. Item 4 was removed for improvement. When Item 4 is removed, the Hoyt is .85 and M.S. items is much improved at 45.23, as shown in Table XXXVI.

Step 4b: From Table XXXII, it can be seen that for the

negative statements Item 1 under the Attitude measure , had a consistently lower mean score than the other items in the subtest, as well as a lower correlation with the other items in the subtest. When item1 is removed, Hoyt became.86 and M.S.items a healthy 8.62, as can be seen in Table XXXVIX.

Step 5: To reiterate the situation, the attitude measure was very reliable , only when negative statements were used, with item1 removed.

In an attempt to improve the belief measure, it was postulated that those respondents who did not believe the negative statements (ie mean score <4), should be eliminated from the results. Only 9 respondents did not believe the negative statements (13,19,26,53,54,63,90,104,124).

As can be seen in Table XXXXI, the reliability statisitics did indeed improve when these responses were deleted : Hoyt =.86 and M.S. items= 8.18 for the Belief Measure, and Hoyt=.84 and M.S. items=48.05 for the attitiude measure (Table XXXXIII).

Step 6: The test for reliability of the Dependant Variable, Belief in a Pro-food additive message , as shown in Table XXXXIV, indicated the test to be releable, with Hoyt = .96 and M.S.items=5.59.

Mutltiple Regression Analysis

Multiple Regression was run using data based on the negative statements only test, minus item 1 on the attitude measure, n=116. Unfortunately, a very low coefficient of regression resulted (R2=13.68) which did not account for any significant amount of variance in the dependant varibale.

Step 7: Since the negative statements did not produce a significant coefficient of determination (R2), attention returned to the positive statements.

The reliability test and ANOVA were run on the positive statements, using the reduced sample (n=116). Both the belief and attitude measures received good Hoyts (.90 and .87 respectively) and fair Mean Square items (61.90 and 59.16 respectively). However, these were not much better than the same tests on the whole sample (n=125), where the attitude measure received Hoyt=.90 and MSI =64.81 , and, the belief measure recieved Hoyt =.88 with MSI =62.18. Better reliability statistics were obtained when item 4 on the Belief measure was droppeed, resulting in Hoyt=.85 and a better MSI of 45.23. This could be justified only in the case of the entire sample, where n=125.

It was therefore decided to analyze the following four types of data using mutliple regression:

      1) n=116

      2) n=125 (minus item 4 belief measure)

      3) n=125 (with item 4 belief measure)

Table XIX - Reliability of ATTITUDE MEASURE Total Test

| Statement | Item Statistics | | | | MSI | Hoyt | S.E. |
	Mean	S.D.	Correlations s.t	t.t			
1. (Pro)							
Item 1	4.73	2.13	0.85	0.66	5.25	0.89	7.41
2	4.75	2.11	0.85	0.68			
3	4.32	1.87	0.79	0.61			
4	4.50	2.11	0.88	0.61			
2. (Anti)							
1	4.88	1.77	0.67	0.41	16.39	0.79	6.85
2	5.70	1.53	0.85	0.46			
3	5.42	1.42	0.73	0.40			
4	5.61	1.44	0.77	0.44			
3. (Anti)							
1	3.79	1.82	0.58	0.38	53.45	0.74	7.98
2	4.94	1.71	0.77	0.50			
3	5.06	1.59	0.71	0.35			
4	5.23	1.60	0.76	0.35			
4. (Anti)							
1	3.89	1.67	0.44	0.26	74.15	0.68	7.84
2	5.29	1.66	0.77	0.43			
3	5.25	1.52	0.70	0.31			
4	5.63	1.42	0.77	0.32			
5. (Pro)							
1	2.94	1.65	0.79	0.52	1.22	0.92	5.28
2	3.03	1.75	0.90	0.56			
3	2.90	1.58	0.91	0.47			
4	2.79	1.62	0.92	0.50			
6. (Pro)							
1	3.72	1.65	0.87	0.51	0.75	0.91	5.37
2	3.54	1.69	0.93	0.48			
3	3.62	1.61	0.83	0.44			
4	3.66	1.72	0.87	0.55			

(MSI=mean square items; Item=adjective pairs of measurement scale; S.E.=standard error; s.t.=sub test, t.t =total test)

Table XX - Total Test Statistics - ATTITUDE Measure

Source of variance	ANOVA Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124	1916.50	15.46
Items	23	2614.80	113.69
Residual	2852	6937.66	2.36
Total	2999	11288.97	3.76
Hoyt=0.87	Standard Error=7.37		

CORRELATIONS						
STATEMENT # 1	2	3	4	5	6	TOTAL TEST
1 1.00	0.23	0.11	0.15	0.33	0.37	.0.72
2	1.00	0.46	0.33	-0.00	-0.04	0.54
3		1.00	0.56	-0.01	-0.03	0.53
4			1.00	-0.04	-0.14	0.46
5				1.00	0.52	0.58
6					1.00	0.56
						1.00

Table XXI – Reliability of BELIEF Measure Total Test

| Statement | Item# | Item Statistics | | | | MSI | Hoyt | S.E. |
| | | Mean | S.D. | Correlations | | | | |
				s.t	t.t			
1. (Pro)	1	2.98	1.63	0.83	0.40	59.34	0.81	7.55
	2	3.48	1.76	0.81	0.45			
	3	3.06	1.79	0.85	0.42			
	4	4.48	1.87	0.59	0.44			
2. (Anti)	1	5.21	1.74	0.94	0.24	10.53	0.93	4.91
	2	5.27	1.69	0.94	0.23			
	3	4.98	1.71	0.89	0.21			
	4	5.68	1.32	0.80	0.29			
3. (Anti)	1	5.18	1.61	0.91	0.06	11.94	0.87	5.20
	2	5.51	1.38	0.90	0.13			
	3	5.27	1.30	0.86	0.14			
	4	5.85	1.14	0.61	0.16			
4. (Anti)	1	5.12	1.52	0.91	0.28	15.93	0.91	4.65
	2	5.34	1.46	0.91	0.30			
	3	4.93	1.43	0.84	0.23			
	4	5.76	1.11	0.80	0.19			
5. (Pro)	1	2.65	1.76	0.71	0.26	40.57	0.79	8.26
	2	2.78	1.79	0.80	0.24			
	3	2.77	1.76	0.78	0.27			
	4	3.86	2.09	0.70	0.37			
6. (Pro)	1	4.14	1.81	0.94	0.45	11.79	0.94	4.94
	2	4.17	1.77	0.93	0.48			
	3	3.86	1.84	0.90	0.46			
	4	4.60	1.69	0.86	0.50			

Table XXII - Total Test Statistics BELIEF in Statements
Measure

ANOVA			
Source of variance	Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124.00	756.70	6.10
Items	23.00	3181.37	138.32
Residual	2852.00	7264.43	2.55
Total	2999.00	11202.50	3.74

Hoyt=0.59   Standard Error=7.58

CORRELATIONS							
Statement#	1	2	3	4	5	6	Total Test
1	1.00	-0.36	-0.39	-0.19	0.40	0.51	0.53
2		1.00	0.38	0.20	-0.22	-0.33	0.26
3			1.00	0.57	-0.52	-0.43	0.14
4				1.00	-0.42	-0.26	0.29
5					1.00	0.34	0.37
6						1.00	0.51
T.T.							1.00

Table XXIII -
Reliability of Total Test, ATTITUDE Minus Item1 on Anti

| Statement | Item# | ATTITUDE MEASURE Item Statistics | | Correlations | | MSI | Hoyt | S.E. |
		Mean	S.D.	s.t	t.t			
1. (Pro)	1	4.73	2.13	0.85	0.64	5.25	0.89	7.41
	2	4.75	2.11	0.85	0.60			
	3	4.32	1.87	0.79	0.59			
	4	4.50	2.11	0.87	0.59			
2. (Anti)	1					2.56	0.82	6.16
	2	5.70	1.53	0.84	0.49			
	2	5.42	1.42	0.83	0.46			
	3	5.61	1.44	0.85	0.48			
3. (Anti)	1					2.75	0.79	7.38
	2	4.94	1.71	0.79	0.54			
	3	5.06	1.59	0.83	0.44			
	4	5.23	1.60	0.81	0.41			
4. (Anti)	1					5.57	0.80	6.76
	2	5.29	1.66	0.79	0.45			
	3	5.25	1.52	0.82	0.41			
	4	5.63	1.42	0.87	0.40			
5. (Pro)	1	2.94	1.65	0.79	0.52	1.22	0.92	5.28
	2	3.03	1.75	0.90	0.56			
	3	2.90	1.58	0.91	0.50			
	4	2.79	1.62	0.92	0.50			
6. (Pro)	1	3.72	1.65	0.87	0.51	0.75	0.91	5.37
	2	3.54	1.69	0.93	0.48			
	3	3.62	1.60	0.83	0.44			
	4	3.66	1.72	0.87	0.55			

Table XXIV - Test Statistics - ATTITUDE - Minus Item1 on Anti

Source of variance	ANOVA Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124	1852.92	14.94
Items	20	2506.60	125.33
Residual	2480	5659.79	2.28
Total	2624	10019.30	3.82

Hoyt=0.85   Standard Error=6.76

CORRELATIONS							
Statement#	1	2	3	4	5	6	Total Test
1	1.00	0.25	0.09	0.14	0.33	0.37	0.70
2		1.00	0.50	0.39	-0.02	-0.07	0.55
3			1.00	0.57	-0.06	-0.06	0.55
4				1.00	-0.06	-0.77	0.50
5					1.00	0.52	0.54
6						1.00	0.52
T.T.							1.00

Table XXV -
Reliability of Total Test, Minus Item 4 Pro BELIEF

Statement	Item#	BELIEF MEASURE Item Statistics		Correlations		MSI	Hoyt	S.E.
		Mean	S.D.	s.t	t.t			
1. (Pro)	1	2.99	1.61	0.91	0.38	8.98	0.88	6.26
	2	3.48	1.76	0.84	0.39			
	3	3.06	1.79	0.91	0.40			
	4							
2. (Anti)	1	5.21	1.74	0.95	0.31	2.86	0.94	4.65
	2	5.27	1.69	0.94	0.30			
	3	4.98	1.71	0.92	0.28			
	4							
3. (Anti)	1	5.18	1.61	0.94	0.14	3.62	0.92	4.50
	2	5.51	1.38	0.93	0.22			
	3	5.30	1.30	0.87	0.19			
	4							
4. (Anti)	1	5.12	1.52	0.94	0.31	5.21	0.91	4.82
	2	5.34	1.46	0.92	0.33			
	3	4.93	1.43	0.85	0.26			
	4							
5. (Pro)	1	2.65	1.76	0.80	0.28	0.64	0.79	7.94
	2	2.78	1.79	0.84	0.26			
	3	2.77	1.76	0.79	0.27			
	4							
6. (Pro)	1	4.14	1.81	0.96	0.40	3.68	0.94	4.75
	2	4.17	1.77	0.93	0.42			
	3	3.86	1.84	0.93	0.43			
	4							

Table XXVI - Test Statistics (Minus Item 4 Pro) BELIEF
Measure

ANOVA			
Source of variance	Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124.00	603.9	4.87
Items	17.00	2396.32	140.96
Residual	2108.00	554.13	2.63
Total	2249.00	8554.35	3.80

Hoyt=0.46   Standard Error=6.69

			CORRELATIONS				
Statement#	1	2	3	4	5	6	Total Test
1	1.00	-0.43	-0.46	-0.20	0.33	0.51	0.44
2		1.00	0.41	0.22	-0.15	-0.35	0.32
3			1.00	0.56	-0.47	-0.43	0.20
4				1.00	-0.42	-0.28	0.33
5					1.00	0.26	0.32
6						1.00	0.44
T.T.							1.00

Table XXVII - Reliability of Pro Statements Only ATTITUDE

		ATTITUDE MEASURE						
Statement	Item#	Item Statistics				MSI	Hoyt	S.E.
		Mean	S.D.	Correlations				
				s.t.	t.t			
1. (Pro)	1	4.73	2.13	0.85	0.69	5.25	0.89	7.41
	2	4.75	2.11	0.85	0.66			
	3	4.32	1.87	0.79	0.64			
	4	4.50	2.11	0.87	0.66			
5. (Pro)	1	2.94	1.65	0.79	0.63	1.22	0.92	5.28
	2	3.03	1.75	0.90	0.72			
	3	2.90	1.58	0.91	0.71			
	4	2.79	1.62	0.92	0.71			
6. (Pro)	1	3.72	1.65	0.87	0.73	0.75	0.91	5.37
	2	3.54	1.69	0.93	0.72			
	3	3.62	1.61	0.83	0.64			
	4	3.66	1.72	0.87	0.74			

Table XXVIII - Test Statistics Pro Statements Only -
ATTITUDE

	ANOVA		
Source of variance	Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124	3425.20	18.12
Items	23	2614.80	64.81
Residual	2852	6937.66	1.90
Total	2999	11288.97	3.71

Hoyt=0.90   Standard Error=4.58

	CORRELATIONS		
STATEMENT #	2	3	TOTAL TEST
1	0.33	0.37	0.77
2		0.52	0.77
3			0.79

Table XXIX - Reliability of Pro Statements Only Test - BELIEF

Statement	Item#	BELIEF MEASURE Item Statistics				MSI	Hoyt	S.E.
		Mean	S.D.	Correlations				
				s.t	t.t			
1. (Pro)	1	2.98	1.63	0.83	0.68	59.34	0.81	7.55
	2	3.48	1.76	0.81	0.71			
	3	3.06	1.80	0.85	0.71			
	4	4.48	1.87	0.59	0.50			
5. (Pro)	1	2.65	1.76	0.71	0.47	40.57	0.79	8.26
	2	2.78	1.79	0.80	0.54			
	3	2.77	1.76	0.78	0.62			
	4	3.86	2.09	0.70	0.64			
6. (Pro)	1	4.14	1.81	0.94	0.75	11.79	0.94	4.94
	2	4.17	1.77	0.93	0.76			
	3	3.86	1.84	0.90	0.75			
	4	4.60	1.69	0.86	0.72			

Table XXX - Test Statistics Pro Statements Only - BELIEF

ANOVA

Source of variance	Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124	2048.73	16.52
Items	11	684.32	62.21
Residual	1364	2773.02	2.03
Total	1499	5506.07	3.67

Hoyt=0.88   Standard Error=4.73

CORRELATIONS

STATEMENT #	1	2	3	TOTAL TEST
1	1.00	0.40	0.51	0.80
2		1.00	0.34	0.73
3			1.00	0.81

Table XXXI - Reliability of Anti Statements Only Test - ATTITUDE

Statement	Item#	ATTITUDE MEASURE Item Statistics				MSI	Hoyt	S.E.
		Mean	S.D.	Correlations s.t	t.t			
2. (Anti)	1	4.89	1.77	0.67	0.49	16.39	0.79	6.85
	2	5.70	1.53	0.85	0.64			
	2	5.42	1.42	0.73	0.59			
	3	5.61	1.44	0.77	0.67			
3. (Anti)	1	3.79	1.82	0.58	0.51	53.45	0.74	7.98
	2	4.94	1.71	0.77	0.73			
	3	5.06	1.59	0.71	0.64			
	4	5.23	1.60	0.76	0.68			
4. (Anti)	1	3.89	1.67	0.44	0.35	74.15	0.68	7.84
	2	5.29	1.66	0.77	0.65			
	3	5.25	1.52	0.70	0.59			
	4	5.63	1.42	0.77	0.65			

Table XXXII - Test Statistics (Anti statements only) ATTITUDE

Source of variance	ANOVA Degrees of Freedom	Sums of Squares	Mean Square .
Indivdual	124	1347.23	10.87
Items	11	537.74	48.89
Residual	1364	2463.94	1.81
Total	1499	4349.08	2.90

Hoyt=0.83   Standard Error=4.46

CORRELATIONS

STATEMENT #	1	2	3	TOTAL TEST
1	1.00	0.46	0.33	0.75
2		1.00	0.56	0.85
3			1.00	0.78

Table XXXIII - Reliability of Anti Statements Only Test - BELIEF

Statement	Item#	BELIEF MEASURE Item Statistics				MSI	Hoyt	S.E.
		Mean	S.D.	Correlations s.t	t.t.			
2. (Anti)	1	5.21	1.74	0.94	0.72	10.53	0.93	4.28
	2	5.27	1.69	0.94	0.68			
	2	4.98	1.71	0.89	0.67			
	3	5.68	1.32	0.80	0.61			
3. (Anti)	1	5.18	1.61	0.91	0.79	10.86	0.87	5.25
	2	5.51	1.38	0.89	0.76			
	3	5.30	1.30	0.86	0.72			
	4	5.85	1.19	0.62	0.51			
4. (Anti)	1	5.12	1.52	0.91	0.73	15.95	0.91	4.65
	2	5.34	1.46	0.91	0.71			
	3	4.93	1.43	0.84	0.63			
	4	5.76	1.11	0.80	0.54			

Table XXXIV - Test Statistics (Anti Statements only) BELIEF

Source of variance	ANOVA Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124	1448.77	11.68
Items	11	121.91	11.08
Residual	1364	1765.52	1.29
Total	1499	3336.20	2.23

Hoyt=0.89 Standard Error=3.77

STATEMENT #	CORRELATIONS 1	2	3	TOTAL TEST
1	1.00	0.39	0.20	0.74
2		1.00	0.57	0.83
3			1.00	0.74

Table XXXV - Reliability of Pro Statements Only Test - BELIEF (Minus Item4)

Statement	Item#	BELIEF MEASURE (MINUS ITEM 4) Item Statistics				MSI	Hoyt	S.E.
		Mean	S.D.	Correlations s.t.	t.t.			
1. (Pro)	1	2.94	1.59	0.90	0.71	10.33	0.87	6.33
	2	3.48	1.76	0.83	0.70			
	3	3.03	1.77	0.91	0.75			
	4							
5. (Pro)	1	2.65	1.76	0.80	0.49	0.69	0.79	7.93
	2	2.78	1.79	0.84	0.57			
	3	2.77	1.76	0.79	0.63			
	4							
6. (Pro)	1	4.12	1.81	0.96	0.75	3.68	0.94	4.75
	2	4.15	1.77	0.93	0.75			
	3	3.84	1.84	0.93	0.77			
	4							

Table XXXVI - Test Statistics (Pro Statements Only) BELIEF

ANOVA Source of variance	Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124.00	1602.04	12.92
Items	8.00	361.84	45.23
Residual	992.00	1865.71	1.88
Total	1124.00	3829.59	3.41

Hoyt=0.85   Standard Error=3.88

CORRELATIONS

STATEMENT #	1	2	3	TOTAL TEST
1	1.00	0.33	0.51	0.81
2		1.00	0.25	0.67
3			1.00	1.00

Table XXXVII -
Reliability of Anti Statements Only Test ATTITUDE

Statement	Item#	ATTITUDE MEASURE (MINUS ITEM 1)				MSI	Hoyt	S.E.
		Item Statistics						
		Mean	S.D.	Correlations				
				s.t.	t.t.			
2. (Anti)	1					2.56	0.82	6.16
	2	5.70	1.53	0.84	0.63			
	2	5.42	1.42	0.83	0.64			
	3	5.61	1.44	0.85	0.69			
3. (Anti)	1					2.75	0.79	7.38
	2	4.94	1.71	0.79	0.73			
	3	5.06	1.59	0.83	0.72			
	4	5.23	1.60	0.81	0.71			
4. (Anti)	1					5.57	0.80	6.76
	2	5.29	1.66	0.79	0.63			
	3	5.25	1.52	0.82	0.69			
	4	5.63	1.42	0.87	0.73			

Table XXXVIII - Test Statistics (Anti Statements Only)
Minus Item 1

| | ANOVA | | |
Source of variance	Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	124	1249.03	10.07
Items	8	68.93	8.62
Residual	992	1420.86	1.43
Total	1124	2738.81	2.44

Hoyt=0.86   Standard Error=3.39

CORRELATIONS

STATEMENT	# 1	2	3	TOTAL TEST
1	1.00	0.50	0.37	0.76
2		1.00	0.57	0.86
3			1.00	0.80

Table XXXIX -
Reliability of Anti Statements Only Test BELIEF

Statement Item#		BELIEF MEASURE (n=116) Item Statistics				MSI	Hoyt	S.E.
		Mean	S.D.	Correlations				
				s.t	t.t			
2. (Anti)	1	5.47	1.50	0.90	0.58	7.96	0.90	4.82
	2	5.52	1.45	0.92	0.56			
	2	5.22	1.54	0.86	0.55			
	3	5.85	1.44	0.75	0.46			
3. (Anti)	1	5.34	1.50	0.89	0.78	7.62	0.86	5.09
	2	5.66	1.25	0.88	0.73			
	3	5.40	1.24	0.85	0.72			
	4	5.90	1.19	0.62	0.55			
4. (Anti)	1	5.28	1.39	0.91	0.69	11.93	0.91	4.21
	2	5.49	1.35	0.92	0.66			
	3	5.03	1.34	0.84	0.64			
	4	5.79	1.12	0.84	0.61			

Table XL - Test Statistics (Anti Statements Only) -BELIEF

Source of variance	ANOVA Degrees of Freedom	Sums of Squares	Mean Square
Individual	115	974.15	8.47
Items	11	89.98	8.18
Residual	1265	1511.86	1.20
Total	1391	2576.00	1.85

Hoyt=0.86   Standard Error =3.63

CORRELATIONS				
Statement # 1	1	2	3	Total Test
1	1.00	0.25	0.02	0.61
2		1.00	0.60	0.83
3			1.00	0.73

Table XLI - Reliability of Anti Statements Only Test -
ATTITUDE

Statement Item#		ATTITUDE MEASURE (n=116) Item Statistics				MSI	Hoyt	S.E.
		Mean	S.D.	Correlations s.t	t.t			
2. (Anti)	1	4.86	1.80	0.66	0.48	16.15	0.79	6.90
	2	5.69	1.56	0.85	0.64			
	2	5.46	1.41	0.74	0.61			
	3	5.60	1.43	0.78	0.68			
3. (Anti)	1	3.78	1.86	0.60	0.53	6.67	0.75	7.99
	2	4.89	1.74	0.78	0.74			
	3	5.08	1.63	0.71	0.63			
	4	5.24	1.60	0.77	0.69			
4. (Anti)	1	3.84	1.69	0.44	0.35	75.46	0.69	7.93
	2	5.28	1.70	0.78	0.64			
	3	5.30	1.56	0.72	0.61			
	4	5.67	1.43	0.77	0.66			

Table XLII - Test Statistics - ATTITUDE

Source of variance	ANOVA Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	115	1308.40	11.38
Items	11	528.60	48.05
Residual	1265	2328.41	1.84
Total	1391	4165.41	2.99

Hoyt=0.84   Standard Error=4.50

CORRELATIONS

STATEMENT	# 1	2	3	TOTAL TEST
1	1.00	0.46	0.34	0.76
2		1.00	0.55	0.85
3			1.00	0.78

Table XLIII - Reliability of Anti Statements Only Test -
ATTITUDE

ATTITUDE MEASURE (MINUS ITEM 1, n=116)							
Statement Item#		Item Statistics				MSI Hoyt S.E.	
		Mean	S.D.	Correlations			
				s.t.	t.t.		
2. (Anti)	1					1.61 0.83 6.07	
	2	5.69	1.56	0.84	0.63		
	2	5.46	1.41	0.84	0.65		
	3	5.60	1.43	0.86	0.70		
3. (Anti)	1					3.63 0.79 7.42	
	2	4.89	1.74	0.80	0.74		
	3	5.08	1.63	0.83	0.72		
	4	5.24	1.60	0.81	0.71		
4. (Anti)	1					5.71 81 6 80	
	2	5.28	1.70	0.79	0.62		
	3	5.30	1.56	0.83	0.71		
	4	5.67	1.43	0.87	0.74		

Table XLIV - Test Statistics (Anti Statements Only) -
ATTITUDE

ANOVA			
Source of variance	Degrees of Freedom	Sums of Squares	Mean Square
Indivdual	115	1206.78	10.49
Items	8	69.82	8.73
Residual	920	1330.85	1.45
Total	1391	2607.45	2.50

Hoyt=0.86   Standard Error=3.40

CORRELATIONS

STATEMENT	# 1	2	3	TOTAL TEST
1	1.00	0.50	0.38	0.76
2		1.00	0.57	0.86
3			1.00	0.80

Table XLV - Reliablity of Measure For BELIEF IN MESSAGE

| Item # | BELIEF IN MESSAGE Item Statistics | | Correlations | |
	Mean	S.D.	s.t.	t.t.
1	4.20	1.85	0.94	0.95
2	4.30	1.82	0.94	0.95
3	4.61	1.68	0.93	0.94
4	4.13	1.67	0.95	0.96

Table XLVI - Total Test Statistics

ANOVA Source of Variance	Degrees of Freedom	Sums of Squares	Mean Squares
Individual	124	1375.20	11.09
Item	3	16.76	5.59
Residual	372	154.99	0.42
Total	499	1546.95	3.10

Hoyt=0.96   Standard Error=3.99

IV. MULTIPLE REGRESSION ANALYSIS

Based on the reliability assessment of the survey, multiple regression analysis was conducted on the data from the anti food additive statements only, with n=116 and minus item 1 on the attitude measure. Results were disappointing, with a low coefficient of determination (.1368), which was not considered to account for a reasonable amount of the variance in belief in the message.

Multiple Regression was then conducted on the positive statements, with n=116, and a reasonable coefficient of determination was obtained (.4814).

Because of the small difference in reliability ratings, another M.R. was run on the pro statements, n=125, minus item 4 on the belief measure, and again a good R^2 of .4809 was obtained.

In an attempt to gain the best possible R^2, item 4 on the

Belief measure was reincluded in the data . An R2 of .4923 was the best result obtained.

Multiple regression was performed on other variations of the data as shown in table XX. The question now presented itself as to which data should be used for the M.R. analysis.

First, it was not really possible to justify using n=116 for the positive statements. The 9 responses were removed on the basis of disbelief in the negative statements. Therefore, it was considered best to use the n=125 data.

Second, should item 4 on the belief measure be retained or eliminated ? The following table summarizes the data on which the final decision was based.

Table XLVII - Criteria for Selecting Data

With Item 4 Belief Measure	Minus Item 4 Belief Measure
Reliability: Hoyt=0.88	Hoyt=0.85
Standard Error= 4.73	Standard Error= 3.88
ANOVA	
Mean Square	Mean Square
Individual 16.29	12.92
Items 62.18	45.23
Residual 2.04	1.88
Total 3.66	3.41
Coefficient of Determination 0.4923	0.4809

Based on the above data, it was felt the removal of item 4 did not result in a great deal of improvement in the statistics, while inclusion of item 4 offered a slightly higher coefficient of determination.

Table XLVIII –
Summary of Multiple Regression Analyses on Various Data

TEST	R^2	A	F	P.V.I. * X4(Bel)	X5(Att)
1. Anti,n=116	13.68	78.11	2.12	12.56%	0.49%
2. Pro, n=116	48.14	5.48	12.41	42.81	2.25
3. Pro, n=116,minus4Bel					
4. Pro, n=125	49.23	0.53	14.06	44.14	2.17
5. Pro, n=125,minus4Bel	48.09	0.72	13.43	40.72	4.28
6. Anti,n=125	17.46	76.86	3.04	16.20	0.30
7. Anti,n=125,minus1Att	17.12	76.62	2.99	16.20	0.35
8. Pro+Anti,n=125 (Pro-4Bel+ Anti-1Att)	25.20	-4.24	4.89	4.71	18.49

*P.V.I. = Porportion of Variance Increment

V. MEAN SCORES OF RESPONSES

The following tables and graphs represent the frequency of responses for the measurement instrument that consisted of negative statements only. It is of interest to note that respondents quite strongly believed the negative statements about food additives (75.2% scored greater than 4.51). Although the statements are not scientifically true, they do represent popular sentiments about the supposed risk to health from food additives. This may be support for the idea that attitudes toward food additives are due to their stereotyped image.

The negative statements were not used because they failed to produce a significant amount of variance when the multiple regression analysis was conducted. This may have been due to the fact that both for the attitude variable and the covariate, the scores were not widely distributed over the total range of possible responses. The resultling lack of variability may have produced the poor coefficient of determination.

In addition, as can be seen in Figure 8, the responses to the attiude measure were also not widely distributed, with 71%

of respondents scoring greater than 4.51. This would normally indicate a positive attitude. However, there appears to be a problem with the scales. If a person is anti-food additive, theoretically he or she should be favourable about the anit-food additive statements and mark the favourable end of the scale and hence receive a low score. (Scoring of scales is reversed for the negative statements).

However, in this case, certain of the adjectives used in the attitude scales seem to act dennotatively. In particular, the words sick, harmful, bad and foolish are clearly associated with food additives by some people and thus the unfavourable end of the scale is marked and respondents receive a high score, even if they have a negative attitude toward food additives.

In the theoretical response, the scales work connotatively by illicitng an affective response to the sentiments expressed in the tatement.

Table XLIX - Response Frequency of Mean BELIEF Scores -
Anti Statements

BELIEF IN STATEMENTS

Score	Statement#2 Freq.	%	Cum.%	Statement#3 Freq.	%	Cum.%	Statement#4 Freq.	%	Cum.%	Average Freq.	%	Cum.%
1	3	2.4	2.4	-	-	-	1	0.8	0.8	-	-	-
2	6	4.8	7.2	1	0.8	0.8	2	1.6	2.4	-	-	-
3	10	8.0	15.2	10	8.0	8.8	8	6.4	8.8	6	4.8	4.8
4	15	12.0	27.2	20	16.0	24.8	23	18.4	27.2	25	20.0	24.8
5	2	22.4	29.6	28	22.4	47.2	32	25.6	52.8	36	28.8	53.6
6	39	31.2	80.8	44	35.2	82.4	39	31.2	84.0	45	36.0	89.6
7	9	?.2	100.0	22	17.6	100	20	16.0	100	13	10.4	100

Mean Score 5.176   5.360   5.240   5.272

```
        Figure  7 - Histogram of Mean BELIEF scores - Anti
                            Statements
    Code
              I
      1.      I
   (0-1.5)    I
              I
      2.      I
  (1.5102.5)I
              I
      3.      I****** (6)
  (2.51-3.5)I
              I
      4.      I************************ (25)
  (3.51-4.5)I
              I
      5.      I********************************** (36)
  (4.51-5.5)I
              I
      6.      I******************************************** (45)
  (5.51-6.5)I
              I
      7.      I************* (13)
  (6.51-7.5)I
              I
              I.........I.........I.........I.........I.........I
              0        10        20        30        40        50
              Frequency       (Number in Brackets=frequency)
```
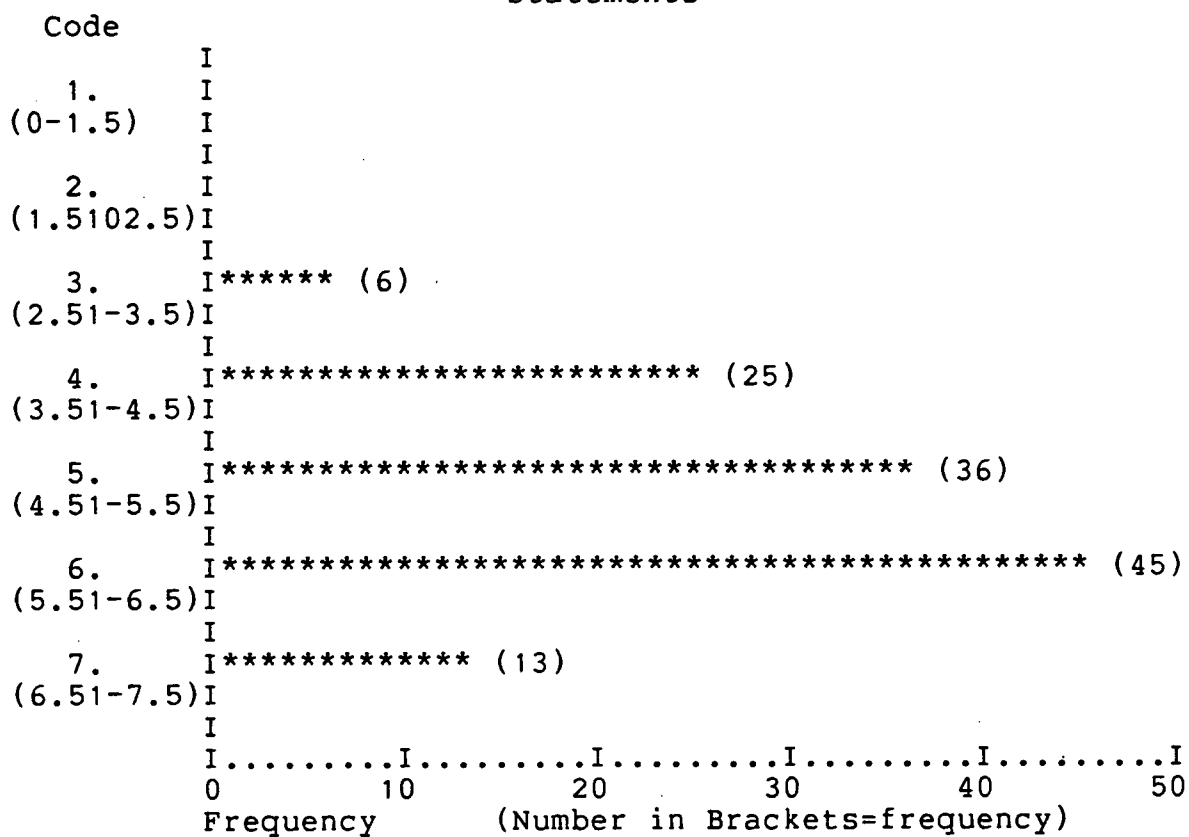
Table L - Response Frequency of Mean ATTITUDE scores -
Anti Statements

Code	Statement #2 Freq.	%	Cum.%	Statement #3 Freq.	%	Cum.%	Statement #4 Freq.	%	Cum.%	Average Freq.	%	Cum.%
1	1	0.8	0.8	3	2.4	2.4	2	1.6	1.6	1	0.8	0.8
2	3	2.4	3.2	6	4.8	7.2	2	1.6	3.2	2	1.6	2.4
3	4	3.2	6.4	3	2.4	9.6	1	0.8	4.0	2	1.6	4.0
4	22	17.6	24.0	48	38.4	48.0	40	32.0	36.0	30	24.0	28.0
5	40	32.0	56.0	36	28.8	76.8	44	35.2	71.2	55	44.0	72.0
6	32	25.6	81.6	18	14.4	91.2	25	20.0	91.2	29	23.2	95.2
7	23	18.4	100	11	8.8	100	11	8.8	100	6	4.8	100

Mean Score 5.280   4.648   4.928   4.976

Figure 8 - Histogram of Mean ATTITUDE Scores - Anti
Statements

```
   Code
             I
     1.      I* (1)
  (0-1.5)    I
             I
     2.      I** (2)
 (1.51-2.5)I
             I
     3.      I** (2)
 (2.51-3.5)I
             I
     4.      I****************************** (30)
 (3.51-4.5)I
             I
     5.      I*******************************************************
 (4.51-5.5)I                                                (55)
             I
     6.      I**************************** (29)
 (5.51-4.5)I
             I
     7.      I****** (6)
 (4.51-5.5)I
             I
             I........I........I........I........I........I
             0       10       20       30       40       50
             Frequency
```
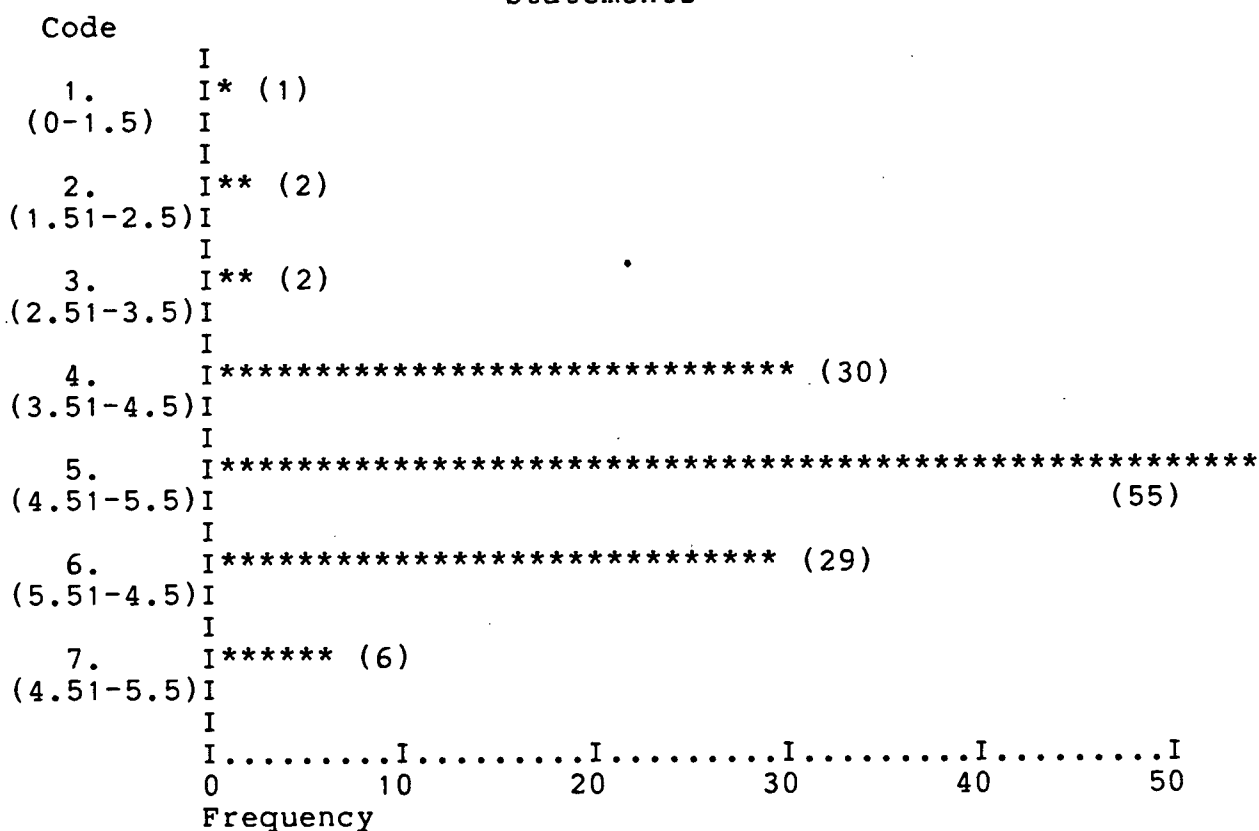
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