CONSUMER RESPONSE

TO GENETICALLY

MODIFIED FOODS

By

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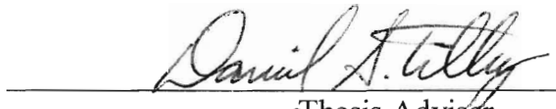

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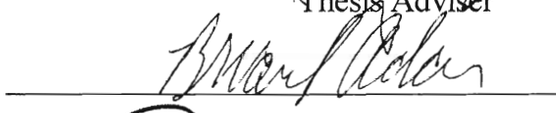

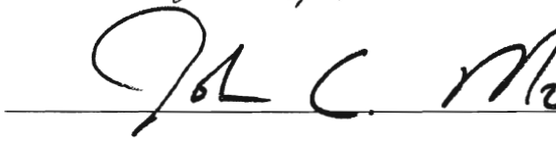

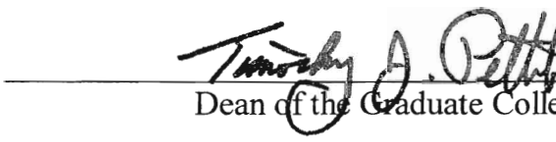

Dean of the Graduate College

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CHAPTER 1

INTRODUCTION

"It is therefore with considerable irony that we note that a society founded and nurtured by intellectuals, a society which has benefited so greatly from a spectacular development and utilization of knowledge, also is a society in which a spirit of anti-intellectualism has periodically slowed economic and social development (Bishop 1977, 34)." A technological evolution from the early 1900's crossbreeding techniques to present-day gene splicing has altered the abilities, traits, and characteristics of farm production across the world. As science has more impact on the food supply, more debates are being heard. Misunderstandings, lack of product knowledge, and increased concerns may influence the speed and acceptance of foods from genetically modified organisms (GMOs).

Problem Statement

Genetically modified foods have endured obstacles on their way to production and usage. Since the evolution of genetic modification or alteration of organisms from crossbreeding techniques in the 1900's, debates have escalated immensely concerning the development and characteristics of genetically modified foods (McHughen 2000). The evolution from crossbreeding to genetic alteration has created concern and trepidation as products containing genetically modified ingredients have become more prevalent. The production process is termed genetic engineering, genetic modification, genetic alteration, or recombinant DNA technology. Genetic modification, a subsection of biotechnology, is the alteration of the basic genetic material with "the introduction by

man of a piece of genetic material into a plant or animal in a way that is not possible using breeding or natural recombination (Custers 2001, p. 7)." In the 1980s, genetic transferring abilities came about, paving the way for the first genetically engineered plants in 1983 (McHughen 2000). In 1994, Calgene produced genetically modified tomatoes called FlavrSavr (Burkhart et al. 2001). In 1995-96, the introduction and approval of Monsanto's Roundup Ready soybeans led to the 1997 commercialization of the product and the production of more genetically modified products (Monsanto Company 2001). Since 1997, over fifty genetically modified food sources have been permitted for commercialization and marketing (Burkhart et al. 2001).

Biotechnology expenditures have increased. In the USA, research and development costs to produce biotechnology products were around $10.7 billion in 2000 (Biotechnology Industry Statistics 2002). In 2000, the revenue from the entire biotechnology industry was $22.3 billion while the money invested in the industry was $353.5 billion (Biotechnology Industry Statistics 2002). A Monsanto representative estimates global research and development expenditures to be around $1 million per day for GMOs products (Rafferty 2001). Van Brunt indicates, "$12 billion was raised in the first three quarters of 2000 in equity investments" (Van Brunt 2002)." Van Brunt also states "public companies raised an additional $731 million in the first quarter of 2001 (Van Brunt 2002)." In Australia, $900 million was raised for funding, 6000 people were employed, 35 public core companies were created, 155 private core companies were created, with $6.5 billion in combined market capitalization (Ernst & Young Australia 2001). Canada estimates "1997 research and development expenditures to total about $600 million (White 2000, p. 3)." This is an expensive endeavor especially considering

that consumers are expressing some reluctance to purchase GMOs products and are currently debating the future marketing abilities and limitations of GMOs products. "Abdul Jalil, director of Saskatchewan Agriculture's research branch expressed the situation the best (Morrison 2001, p. 1)." He said, "If there are no markets, there's no point for us to put money into some of these programs. We have to use it where the producers want it (Morrison 2001, p. 1)."

About ten years ago, GMOs began showing up quietly on the shelves of grocery stores and in farmers' fields. As more products and items emerged containing ingredients from GMOs, debates involving the production methods, safety, and need for new methods have formed across the world. Since laboratories and scientists are creating a new product, consumers are concerned about how the changes will affect them. Society does not have final answers as to what alterations will occur in nature, how the transformations will affect them or the products, or the safety of product changes (Custers 2001).

The questions posed by consumers and governments are increasing as opinions about the products are mounting and laws concerning the production and marketing are being passed. Europe and India are requiring "mandatory and comprehensive labeling of all products of biotechnology (McHughen 2000, p. 202)." "Canada, the USA, Australia, New Zealand, and some South American countries request labeling only on products carrying new health or safety concerns and if the product is substantially equivalent to the traditional counterpart, no labeling is needed (McHughen 2000, p. 202)." Substantial equivalence is determined as being similar and posing comparable risks to previous products based on the previous product's safe status (McHughen 2000).

Previous product safety is being used to indicate the new product's safety. Countries, spurred by activists debating each facet of the issue, are taking stands as to how the new product can be marketed and sold. Greenpeace, ban-GMOs, and similar groups desire to ban GMOs while many pro-GMO groups are fighting for expanded acceptance. Research is used to determine the viewpoints and desires of countries, consumers, and governments towards GMOs. Past research for consumers has mainly focused on the consumers' attitudes, responses, and knowledge of genetically modified organisms. Senauer focused on the perceptions of consumers towards genetically modified products and the level of the technology knowledge (Senauer 2001). As information is surfacing relating to genetically modified organisms and products, researchers are searching for answers as to why individuals are reacting in these manners.

Research Significance

Information concerning individuals' reactions and responses to GMOs is limited. Limited information is found concerning consumers' attitudes towards GMOs. Consumer preferences for the product, concerns about the manufacture of the products, and the knowledge levels of the majority of the population have been the topic of most research (Senauer 2001). Companies, governments, and scientists are faced with locating information about genetically modified foods and attempting to understand what motivates people's concern towards these products. The underlying factors influencing consumers' reactions to GMOs are not understood.

Objective

The objective is to determine which consumers traits and characteristics are related to positive or negative reactions to food products made from GMOs. A secondary objective is to determine the best way to model consumer reactions to genetically modified organisms.

CHAPTER 2

ECONOMICS, MARKETS, AND MODELS

Consumer demand determines the ultimate success or failure of products in the market. Demand is determined from the interaction of preferences represented by utility functions and the budget constraint faced by consumers. It is hypothesized that consumer personality traits affect preferences, which in turn influence consumer behavior in the marketplace. When the relationship between personality traits and preferences is better understood, market demand can be better evaluated.

This thesis hypothesizes that the personality of a consumer and the traits underlying personality distinguish each consumer's preferences for products and services. If the traits are known and the personality is established from traits, the consumer's preferences and behavior based on these preferences can be better understood.

Economics and Markets

In producing a good for sale, the producer needs to understand consumer decisions and preferences. The theory of consumer behavior is the "description of how consumers allocate incomes among different goods and services to maximize their well being (Pindyck et al. 2001, p. 62)." There are three basic axioms that form the underlying foundation of utility. The three axioms are comparability, transitivity, and continuity. Comparability allows the ranking of two competing items or bundles of items, which we will call A and B, in three different ways. The three ways are "A is preferred over B, B is preferred over A, and A and B are equally preferred (Nicholson

1998, p. 69)." Transitivity is the ranking of three items, say A, B, and C. If an individual ranks A over B and also ranks B over C, then transitivity assumption says A is preferred over C (Phlips 1974). "The consumer's preferences are consistent: he never contradicts himself (Phlips 1974, p. 5)." The last assumption is continuity. Continuity states if A is preferred over B and another item is similar to A, then the similar item is also preferred over B (Phlips 1974). The three axioms characterize rational behavior. "Although a number of sets of such axioms have been proposed, all have similarities in that they begin with the concept of "preference": When an individual reports that "A is preferred to B," it is taken to mean that all things considered, he or she feels better off under situation A than under situation B (Nicholson 1998, p. 69)." The three axioms of utility provide the basis for the existence of preference ordering and utility functions.

One important facet of consumer behavior is "consumers spend everything they earn on goods and services, including savings (Nicholson 1998, p. 73)." The other piece of consumer behavior is the consumer "prefers more to less (Phlips 1974, p. 8)." The monotonicity axiom forces the utility function to be "a strictly increasing function of the quantities consumed (Phlips 1974, p. 8)." Consumers' prefer more, but their purchasing ability is limited by their individual budget constraint (Nicholson 1998). The individual budget constraint is the amount of monetary income capable of being spent on goods and services (Nicholson 1998). The monetary constraint forces consumers to allocate money based on the characteristics of the specific items deemed necessary to maximize utility or satisfaction. Economists use the utility as the basis of demand to comprehend consumer behavior in the marketplace. "Individual's preferences are assumed to be represented by a utility function of the form $U(X_1, X_2, \ldots, X_n)$, where $X_1, X_2, \ldots, X_n$ are the

quantities of each of n goods that might be consumed in a period (Nicholson 1998, p. 73)."

The budget constraint determines the combinations that can be purchased with a given income. The budget constraint is $I = \sum_{i=1}^{n} p_i q_i$, where n is the number of items, p is the price of the individual items, q is the quantity purchased of the items, and I is the income available to be spent on the market basket of goods. The intersection of the budget constraint and the utility function provides the maximization of utility subject to the income/budget constraint. The Lagrangean function demonstrated by $L = U - \lambda(I - p_1 q_1 - p_2 q_2 - \ldots - p_n q_n)$ is the utility function minus the Lagrangean multiplier times the budget constraint set equal to zero. The first order conditions for utility maximization are found by taking the first derivative of the Lagrangean function in terms of $q_1, q_2, \ldots, q_n$, and λ. That is:

$$(1)\frac{\partial L}{\partial q_1} = \frac{\partial U}{\partial q_1} - \lambda p_1 = 0$$

$$(2)\frac{\partial L}{\partial q_2} = \frac{\partial U}{\partial q_2} - \lambda p_2 = 0$$

$$\vdots$$

$$(3)\frac{\partial L}{\partial q_n} = \frac{\partial U}{\partial q_n} - \lambda p_n = 0$$

$$(4)\frac{\partial L}{\partial \lambda} = I - p_1 q_1 - p_2 q_2 - \ldots - p_n q_n = 0$$

Given a specific form of the utility function, demand functions for q_1, q_2,..., q_n can be derived. The demand function for q_1 ....q_n is a function of prices and income presented by $g_i(p_1, p_2, ..., p_n, I)$.

Standard demand theory suggests that goods enter the utility functions directly. Lancaster suggested that characteristics enter the utility function and goods are a means of acquiring the desired characteristics. According to Lancaster, "individuals differ in their reactions to different characteristics (1971, p.7)." "It is the characteristics in which consumers are interested (Lancaster 1971, p. 7)." "The CGCM-the consumer goods characteristics model-looks upon a product as a collection of characteristics (Ladd et al. 1976, p. 504)." Utility is the satisfaction gleamed from a product or a group of products or the characteristics of the products. Given that consumers spend their entire income on products, each individual consumer selects groups of goods and services that best maximize their individual utility. Ladd using Lancaster's framework assumed that "the total amount of utility a consumer enjoys from his purchases of products depends upon the total amounts of product characteristics purchased (Ladd 1976, p. 504)." Ladd defined "x_{0j} as the total amount of the *j*th product characteristic provided to the consumer by consumption of all products and x_{ij} as the quantity of the *j*th characteristic provided by one unit of product *i* (Ladd 1976, p. 504)." The quantity of the *i*th product consumed is q_i (Ladd 1976). There are *n* products and *m* general product characteristics and n unique characteristics only available from product i (Ladd 1976). Following Lancaster, Ladd expressed total consumption of each characteristic as a function of quantities of products consumed and the consumption input-output coefficients:

(5) $x_{0j} = f_j(q_1, q_2, ..., q_n, x_{ij}, x_{2j}, ...x_{nj})$ *for all* $j = 1,2,....., m$ and

$x_{0m+i} = f_{m+i}(q_i, x_{im+i})$ for i= 1,2,….n. (Ladd 1976, p. 505)."

"The consumer's utility function is expressed as

(6) $U = U(x_{01}, x_{02}, \ldots x_{0m}, x_{om+1}, \ldots\ldots, x_{0m+n})$ (Ladd 1976, p. 505)."

Each x_{oj} is a function of the q_i's and the x_{ij}'s. Therefore, substituting equation five into six, you find:

(7) $U = U(q_1, q_2, \ldots\ldots, q_n, x_{11}, x_{12}, \ldots\ldots, x_{1m}, x_{21}, \ldots\ldots, x_{nm}, \ldots\ldots x_{nm+n})$ (Ladd 1976).

Consumers are able to influence the q_i's, but are unable to adjust the x_{ij}'s (Ladd 1976). The budget constraint is expressed as a function of the quantities, prices, and income.

(8) $\sum_i p_i q_i = I$

The values of the q_i that are selected by the consumer to maximize the Lagrangian

(9) $L = U(x_{01}, x_{02}, \ldots\ldots, x_{0m+n}) - \lambda\left(\sum_i p_i q_i - I\right)$ (Ladd 1976).

The combination of products that provides the combination of total product characteristics that maximizes utility are selected by the consumer (Ladd 1976). Ladd's review of Lancaster where choices of products are based on their different characteristics is particularly interesting because we are interested in demand for products made from genetically modified organisms.

In comparison of preference using the axioms, "commodity bundles are ordered in the same way as words are in a dictionary (Phlips 1974, p. 7)." When the ordering of goods occurs, preferences predict where, when, and if a good or its characteristics ranks in the utility function. A consumer can opt for choosing from a set of goods that do not have a particular characteristic. The preference for a commodity bundle void of a certain characteristic is referred to as lexicographical exclusion. A particular consumer may

desire to exclude a food from her bundles because it is made from genetically modified organisms. The individual's personality determines her reaction and desire or lack of desire to exclude the product from the bundle.

Demand found by maximizing consumer utility subject to a budget constraint aids in explaining how consumers will behave in the marketplace. However, preferences are assumed to be given and limited work on understanding differences in preferences for GMOs and their relationship to personality traits is available. Neoclassical demand theory or the Ladd and Lancaster characteristics approach cannot be applied for goods that are excluded from the choice set if they possess a particular characteristic. For some consumers, we hypothesize that particular characteristics (e.g., absence of genetically modified organisms) are deemed prerequisites for inclusion in the set of goods from which some consumers chose. Other consumers may evaluate the inclusion of genetically modified organisms in foods like other food characteristics.

Consumer preferences and the underlying factors leading to the preferences in the subject of this study. Preferences explain how consumers chose among products and what characteristics are important. Preferences are hypothesized to be related to the personality type of the consumer. Consumers react differently when choosing among products and display the foundation of their individual personalities and traits that will determine their reaction to products in the future. The characteristics of the product or group of products relate to the preferences of consumers.

Preferences, Personality, and Traits

Personality is "the complex of characteristics that distinguishes an individual or a nation or group, especially the totality of an individual's behavioral and emotional characteristics (Merriam-Webster 1996)." Mowen (1993) suggests that an individual's personality is based on consistency of performance, the ability to distinguish an individual from other individuals, situational interaction unique to an individual, and lack of ability to accurately forecast a behavior on one specific event from a single determinate of personality. Personality research has focused on traits. Traits are defined as "any characteristic on which a person may differ from another in a relatively permanent and consistent form (Mowen 1993)." The goal of this research is to determine the personality and traits that affect rankings of food products from genetically modified organisms.

Personality Foundation Models

Personality models assist in comprehending consumers' behavior in the market place. The basic models indicate the nature of human personality and allow researchers to dissect personality into basic traits.

Aspects of Allport's and Stagner's 1937 lexical models are the foundation of many models that followed. Allport used the English language as the groundwork for his theory and research (Craik et al. 1993). A total of 18,000 words made the final cut to compose the four categories of "personal traits, temporary states, social and character judgments, and physical characteristics (Craik et al. 1993)." Allport later joined with

Odbert to create and reaffirm Allport's original findings. This led to the acceptance of the three differentiable categories predicting the personality descriptors.

Norman enlarged upon Allport and Odbert's model to include three additional categories thus narrowing the categorical differences among the descriptors (Craik et at. 1993). The seven categories for Norman are "stable 'biophysical' traits, temporary states, activities, social roles, social effects, evaluative terms, anatomical and physical traits, and ambiguous and obscure terms no longer used for consideration (Craik et al. 1993, 217)." These seven categories were deemed as the lexical personality trait descriptors. Ahgleitner, Ostendoft, and John, using the German language, produced thirteen categories and cemented Allport and Odbert's findings (Craik et al. 1993). Cattell further reduced and worked on Allport and Odbert's model to find only 4,500 words of relevance linking to 35 variable traits and twelve personality factors (Craik et al. 1993). While the amount of language necessary to adequately describe personalities were being debated and discussed, the findings of the two central traits emerged onto the scene. The traits were extraversion and neuroticism. Costa and McCrae added openness to the structure generating the NEO (neuroticism-extraversion-openness) model of personality traits (Craik et at. 1993). A modification to this model included the addition of agreeableness and conscientiousness. While the debate over the naming of the terms and the number of the terms continues, the five personality trait descriptors, which are neuroticism, extraversion, openness, agreeableness, and conscientiousness, are generally accepted as the starting point for further research.

Big Five

The "Big Five" was an offshoot of Allport and Odbert's model. Norman's later findings helped to produce the "Big Five" personality concept and traits. Those works produced the traits of "extraversion, agreeableness, conscientiousness, emotional stability (reversed as neuroticism), and culture (later termed openness) (Williams et al. 1998)" Numerous studies, often through factor analysis, repeatedly found and confirmed the five trait factors and their relevance and reliability to the overall personality model. The factor analysis method using the correlations to determine the variables of interest, while finding a consistent number of traits, had different labeling techniques (Block 1995, 189). Nevertheless the "convergence between the lexical and questionnaire approaches led to a dramatic change in the acceptance of the five factors in the field (Craik et al.1993)." The naming of the traits was seen as a formality based on the personality of the researchers and the personal determination of the proper expression of the trait. The "Big Five" eventually led to the five-factor model.

Five-Factor Model

"The empirically derived taxonomy of the Big Five personality trait descriptors is dissimilar from the Five Factor model of personality traits (Craik et al. 1993)." The Five Factor model is a hierarchical-based model indicating that the level of attained information diminishes as the model levels increase (Craik et al. 1993). The model has been challenged, tested, and accepted as the fundamental model of trait factors by many individuals and researchers.

As each researcher probed, tested, and evaluated human subjects, sometimes with the aid of questionnaire tactics, to produce the foundation and elemental traits, the accepted model is definite on the five factors implication. The five factors are in some defining way similar to extraversion, agreeableness, conscientiousness, stability, and openness to change (Mowen 2000). Mowen expanded upon this foundation to build the 3M model of personality and motivation (2000). The expansion, while assisting in the cementation of the terminology, facilitates further research into the consideration and possible proof of supplementary explanatory human personality traits.

The 3M Model

The 3M model of consumer behavior is a Meta-theoretical model of motivation and personality, which was formed by Mowen (2000). Mowen credits new technology and the increased use of alternative measures in the formulation of the new model (2000). The 3M model incorporates the four sciences of "control theory, trait theory, hierarchical personality models, and evolutionary psychology (Mowen 2000, p. 274)." The four sciences influence and determine the structure of the research, while most other research has been based on a limited scientific view. The 3M model includes the basic foundation model, but extends the trait theory further to include compound, situational, and surface traits. The hierarchical model's structure is best explained by the following figure adopted from Mowen (2000, p. 33).

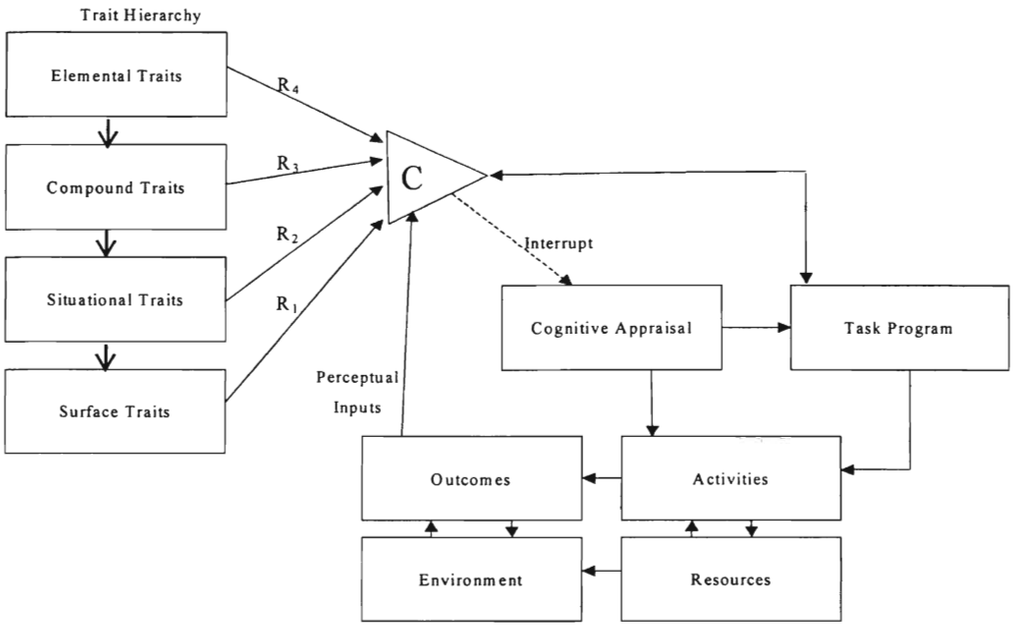

Figure 1 The 3M Model of Motivation and Personality adapted from Mowen (2000, p. 33)

The hierarchical model begins with the most abstract elemental traits, combines to form the compound traits, increases to the situational traits, and stops at the highest level and most easily examined surface traits (Mowen 2000). The elemental traits combine with the environment to produce the compound traits (Mowen 2000). The compound traits combined with a specific situation produce the situational traits (Mowen 2000). The situational traits along with the lower two traits form the surface traits (Mowen 2000). Preferences for goods or characteristics of goods are surface traits. The traits act as "reference points for the comparator, represent enduring dispositions, and are inextricably intertwined with needs, values and goals (Mowen 2000, p. 37)." The comparator C "compares outcomes with the referent values/goals resulting from the traits of the person. It is the locus of feelings and emotions. Emotions result from the comparison of desired outcomes to actual outcomes. When the difference between the reference point and actual state becomes sufficiently large, and interrupt occurs, which activates the cognitive

The 3M Model's Relevance

Most personality trait models stop at the elemental trait explanation and exploration. The 3M model assists in the naming and determination of the traits relevant at each level. Traits at each level are described below. The elemental traits are "openness to experience, conscientiousness, extraversion, agreeability, neuroticism (emotional stability), material needs, arousal needs, and physical/body needs (Mowen 2000, p. 29)." Examples of compound traits are task orientation, learning needs, competitiveness, activity needs, play needs, and self-efficacy (Mowen 2000). The situational traits assisting in the explanation of some surface traits are health motivation, impulsiveness, value consciousness, sports interest, and frugality (Mowen 2000). The viewable surface traits examined by Mowen are healthy diet lifestyle, compulsive consumption, bargaining proneness, sports participation, and modest living (Mowen 2000). The understanding of the separate traits and their interaction is used to assist in the understanding of preference for food products containing GMO's.

Mowen uses both a fully mediated model and a partially mediated model to explain the interaction among the traits. In a fully mediated model, the higher level traits contain all the information of the more abstract traits. For example, compound traits are composed of the significant elemental traits and carry the information of the elemental traits to the situational trait. In a partially mediated model, traits at all levels aid in the explanation of the surface trait. Elemental, compound, and situational traits, regardless of hierarchical level interact to form the surface trait.

By understanding the traits and the way the traits interact to form the surface traits, researchers can determine, by viewing the surface traits, the reactions of consumers to a product or service. Knowledge of the traits and their interaction to form a reaction allows researchers the ability to form expectations of reactions in the future. Thus the traits make up the viewable personality, and personality aids in understanding preferences for goods or characteristics of goods. A strength of Mowen's approach is his willingness to operationalize and empirically relate the theoretical concepts to data that can be acquired from questionnaires.

CHAPTER 3

EMPIRICAL ANALYSIS

The interaction among the traits is first demonstrated through the estimation of a fully mediated model. Using a fully mediated model, the traits are linked together using linear regression. The compound traits are linearly regressed on the separate elemental traits to determine which elemental traits explain the individual compound traits. Once the relationship between the elemental traits and the compound traits are discovered, the individual situational traits are hypothesized to be linearly related to their compound traits. The surface trait of interest in this study is the consumer's attitude towards genetically modified foods. This trait is hypothesized to be linearly related to the situational traits in the fully mediated model. Following the fully mediated model, a partially mediated model for consumer attitude toward genetically modified foods is estimated.

Data and Calculation of Traits

Dr. John Mowen provided archived data used in this study. According to Mowen,

> "Respondents were obtained from a consumer panel run by Market Facts, Inc. The four-page survey was sent to 600 members of the panel. They were selected by the administrator of the panel so as to match the population characteristics of the United States on age, household income, education, race, gender, and geographic location. Completed surveys were received from 354 respondents- a 59 percent response rate. The demographic characteristics of the sample are: 48 percent male, 68.4 percent married, and 83.3 percent Caucasian. Thirty-five percent have attended college, and 16.4 percent graduated from college. The age of the respondents is evenly distributed between 25 and 64 years old. Eighty-eight percent of the respondents are in this age range (Mowen, p. 12)."

Editing resulted in the loss of four observations, and minor changes in 21 observations leaving 350 complete observations to use in calculations and regressions.

Twenty-eight constructs are in the questionnaire (Appendix). The indicators of the eight elemental traits, eight compound traits, and twelve situational traits were included. As shown in the questionnaire respondents were asked how frequently they '...felt or acted this way'.

Responses for the elemental and compound traits are measured on nine-point rating scales bounded by 'never' and 'always' and located in question one of the questionnaire. The situational and surface traits were measured on a seven-point Likert scales and are in question two of the questionnaire. Three items assess the seers ability, which is a situational trait explaining the belief in predictors (e.g., 'There are people who can predict the future'). Three items assess sports participation (e.g., 'Participating as a player in sports is fun for me'). Astrology is assessed through six questions (e.g., 'Astrology can predict the future'). Bioengineered product interest is assessed through the use of four questions (e.g., 'The genetic engineering of foods is a serious threat').

The eight elemental traits are measured using a nine-point scale. Introversion is "the tendency to reveal feelings of bashfulness and shyness (Mowen 2000, p. 29)." It is measured by four responses (e.g., 'Feel more bashful than others'). Conscientiousness is "the need to be organized, orderly, and efficient in carrying out tasks (Mowen 2000, p. 29)." Four responses measure conscientiousness (e.g., 'Precise'). Openness to experience is "the need to find novel solutions, express original ideas, and use the imagination in performing tasks (Mowen 2000, p. 29)." Four responses measure the

openness to experience trait (e.g., 'Frequently feel highly creative). Agreeability is "the need to express kindness and sympathy to others (Mowen 2000, p. 29)." Four responses measure the agreeability trait (e.g., 'Ttender hearted with others). Neuroticism or emotional instability is "the tendency to emotionality as expressed by moodiness and by being temperamental (Mowen 2000, p. 29). Four responses measure the neuroticism trait (e.g., 'Moody more than others'). Material needs is expressed as "the need to collect and posses material goods (Mowen 2000, p. 29)." Four responses measure the material needs trait (e.g., 'Enjoy buying expensive things'). Arousal needs is "the desire for stimulation and excitement (Mowen 2000, p. 29)." Arousal needs is measured by four responses (e.g., 'Drawn to experiences with an element of danger'). Physical/body needs is "the need to maintain and enhance the body (Mowen 2000, p. 29)." Four responses measure the physical/body needs trait (e.g., 'Focus on my body and how it feels').

The eight compound traits were measured using a nine-point scale. Competitiveness is "the enjoyment of interpersonal competition and the desire to win and be better than others (Mowen 2000, p. 81)." Four responses were used to measure competitiveness (e.g., 'Enjoy competition more than others'). Altruism is an unselfish regard for or devotion to the welfare of others. Altruism is measured by four responses (e.g., 'Sacrifice my goals to help others'). Need for learning is the desire and enjoyment of learning new things and the belief that information is important. Four responses measure need for learning (e.g., 'Information is my most important resource'). Activity needs is the enjoyment of being busy and trying to over accomplish in one day. Four responses measure activity needs (e.g., 'Try to cram as much as possible into a day').

Self-efficacy is the belief in self-control and personal abilities. Four responses measure self-efficacy (e.g., 'Once I make up my mind, I can reach my goals'). Poetry is the generic term used to represent the interest in the arts and culture. Poetry is measured by four responses (e.g., 'I consider myself to be a highly artistic person'). The voluntary trait is the desire to give and assist in an unpaid manner to my community and area. Four responses measure the desire to volunteer (e.g., 'Identify community problems and do something to help'). Present thinking is the desire to live in and for the future and to not plan in advance for future occurrences. Present thinking is measured by four responses (e.g., 'The distant future is too uncertain to plan for').

The twelve situational traits are measured using seven-point scales. Seers/predictors is the belief that individuals can predict the future. Seers is measured by three responses (e.g., 'There are people who can predict the future'). Sports interest is the desire and enjoyment of sports participation. Three responses measure sports interest (e.g., 'Playing sports is extremely appealing to me'). Astrology is believing the prediction of the supposed influences of the stars and planets on human affairs and terrestrial events by their positions and aspects (Webster 1996). Astrology is measured by four responses (e.g., 'Astrology can predict the future'). Gambling interest is the desire and enjoyment gleamed from wagering money on questionable outcomes. Four responses measure gambling interest (e.g., 'I really enjoy gambling for money'). Athleticism is the individual capabilities and skills allowing sports abilities. Athleticism is measured by three responses (e.g., 'From a young age I have been good at sports'). Belief in science is the understanding and conviction that science explains nature. Science belief is measured by three responses (e.g., 'I strongly belief that science

explains nature'). Retirement is the withdrawal from one's position or occupation or from active working life or to plan for the withdrawal. Four responses measure the retirement trait (e.g., 'I (we) have a financial plan that will take care of retirement'). Sports fan is the desire to and enjoyment gained from watching sports. Sports fan is measured by three responses (e.g., 'Watching sports as a fan is fun for me'). Superstition is a belief or practice resulting from ignorance, fear of the unknown, trust in magic or chance, or a false conception of causation (Merriam-Webster 1996). Superstition is measured by four responses (e.g., 'Black cats bring bad luck'). Fashion interest is the desire and enjoyment gained from fashion and fashion trends. Fashion interest is measured by four responses (e.g., 'It is important to me to be a fashion leader'). Auto innovativeness interest is the interest and desire to own the newest, best car on the market. Auto innovativeness interest is measured by four responses (e.g., 'I like owning a car that I can show off to others'). Travel innovativeness interest is the enjoyment gained from travel to new and exotic locations and the sharing of the experience. Four responses measure travel innovativeness interest (e.g., 'I enjoy traveling to unusual places').

The surface trait is measured using a seven-point scale. Bioengineered product interest is the negative response and concern of consumers towards bioengineered products. The questions that measure bioengineered product interest are 1) the genetic engineering of foods is a serious threat, 2) biotechnology will do more harm than good, 3) genetically modified foods should be banned until their safety is proven, and 4) I would pay 25% more for a food product guaranteed NOT to contain genetically modified ingredients.

Variables representing the traits are the means of the questions associated with the individual trait (Table 1) are used. The means are the responses to the questions in the survey delineating the traits are summed together and divided by the number of questions relevant to each trait. Coefficient alpha is used to determine whether or not the questions are internally consistent. Coefficient alpha is the reliability estimate of use to indicate scale reliability (Zumbo 1999). Coefficient alpha is the "squared correlation between the observed value and the true value (SAS)." Coefficient alpha is calculated as "$\rho_\alpha = \left[\frac{k}{k-1}\right]\left[1-\frac{\sum \sigma_i^2}{\sigma_x^2}\right]$", where k is the number of variables, σ_i^2 is the variance of the questionnaire items, σ_x^2 is the variance of the sum of the items. Coefficient alpha is the lower bound estimate of reliability. For example, for introversion, k is four, σ_i^2 is the variance for Q1X1, Q1X2, Q1X3, and Q1X4, and σ_x^2 is the variance of introversion. (Q1X1 is item one of question one. Q1X2 is item two of question one.) The internal consistency is indicated by the true measure divided by the estimated measure. If the ratio of the measures is close to 1, this indicates the proximity of the true versus the estimated calculations (Zumbo 1999). If the coefficient alpha is greater than .70, internal consistency is suggested. Listed in Table 1 are the means, variances, number of variables (k), and the coefficient alpha of each elemental, compound, situational, and surface trait. All the questions and traits passed the coefficient alpha test.

Table 1. Questions used to calculate the means, variances, and coefficient alpha for each trait.

Trait level	Trait	Questions	K	Mean	Variance	C Alpha
Elemental						
	Introversion	Q1X1, Q1X2, Q1X3, Q1X4	4	3.893571	3.6625271	0.9132
	Conscientiousness	Q1X5, Q1X6, Q1X7, Q1X8	4	6.562857	3.0203903	0.9229
	Openness to Experience	Q1X9, Q1X10, Q1X11, Q1X12	4	5.423571	3.4362964	0.9394
	Agreeability	Q1X13, Q1X14, Q1X15, Q1X16	4	7.069285	1.8456513	0.8723
	Neuroticism	Q1X17, Q1X18, Q1X19, Q1X20	4	4.227857	3.6300599	0.9133
	Material needs	Q1X21, Q1X22, Q1X23, Q1X24	4	4.064286	3.858678	0.8885
	Need for arousal	Q1X25, Q1X26, Q1X27, Q1X28	5	3.433571	3.6135904	0.9152
	Physical/body needs	Q1X29, Q1X30, Q1X31 Q1X32	5	4.937857	3.4167933	0.8883
Compound						
	Competitiveness	Q1X33, Q1X34, Q1X35, Q1X36	4	3.737857	4.2070514	0.9257
	Altruism	Q1X37, Q1X38, Q1X39, Q1X40	4	6.114286	2.0352538	0.8325
	Need for learning	Q1X41, Q1X42, Q1X43, Q1X44	4	6.055714	2.2723169	0.8568
	Activity needs	Q1X45, Q1X46, Q1X47, Q1X48	4	6.287143	3.3732582	0.9102
	Self-efficacy	Q1X49, Q1X50, Q1X51, Q1X52	4	6.182857	3.0155361	0.8988
	Poetry	Q1X53, Q1X54, Q1X55, Q1X56	5	4.632143	3.4654753	0.8517
	Voluntary	Q1X57, Q1X58, Q1X59, Q1X60	8	4.617143	3.6305793	0.9169
	Present thinking	Q1X61, Q1X62, Q1X63, Q1X64	4	4.63	3.259914	0.8395
Situational						
	Seers/predictors	Q2X1, Q2X2, Q2X3	3	3.327619	2.5335554	0.9221
	Sports interest	Q2X4, Q2X5, Q2X6	3	3.416191	3.7877664	0.9641
	Astrology	Q2X7, Q2X8, Q2X9, Q2X10	6	2.705714	2.4425173	0.958
	Gambling interest	Q2X11, Q2X12, Q2X13, Q2X14	7	2.013571	6.3216326	0.8904
	Athleticism	Q2X15, Q2X16, Q2X17	6	2.514286	2.6491107	0.9209
	Belief in science	Q2X18, Q2X19, Q2X20	3	4.428571	2.1150679	0.8458
	Retirement	Q2X21, Q2X22, Q2X23, Q2X24	4	3.872857	3.127055	0.9417
	Sports fan	Q2X25, Q2X26, Q2X27	5	3.701905	3.8023206	0.9253
	Belief in superstition	Q2X28, Q2X29, Q2X30, Q2X31	4	1.692857	1.6127712	0.9572
	Fashion interest	Q2X36, Q2X37, Q2X38, Q2X39	4	2.401429	1.8305138	0.9127
	auto innovativeness interest	Q2X40, Q2X41, Q2X42, Q2X43	5	2.19	1.7951002	0.8375
	travel innovativeness interest	Q2X44, Q2X45, Q2X46, Q2X47	5	3.670714	2.4129292	0.8188
Surface						
	Bioengineered product interest	Q2X32, Q2X33, Q2X34, Q2X35	4	3.942857	2.0683585	0.877

* If the coefficient alpha is greater than .70, the trait is adequately represented by the responses the questions.

Variances for the individual responses are shown in the Appendix.

C Alpha is coefficient alpha

RESULTS

Regressions were run for each individual trait. The hypothesis for each regression was based on a rejection region for each independent trait of a p-value greater than .10. The regressions are estimated for each compound, situational, and surface trait. Each equation was tested for normality, heteroskedasticity, and non-linearity. The

Kolmogorov-Smirnov testing procedure was used for normality testing. Non-linearity was tested using a joint conditional means tested presented by McGuirk, et. al (1993). Heteroskedasticity tests were based on a joint conditional variance test also presented by McGuirk, et. al (1993). SAS version 8 was used to estimate the regressions and aid in the specification testing. All of the results shown are for linear models.

Estimation of the Fully Mediated Model

Compound Traits

Listed in the table below is the make up of each compound trait, the elemental traits used in the regression, the coefficient of the elemental traits, the F-value, R^2, significance for each coefficient, the test for normality, nonlinearity, and heteroskedasticity.

According to the regression and the p-values compared to the rejection region, several elemental traits are significant in the equation for the compound traits. The f-values of all linear regressions of compound traits are significant. The breakdown of the traits, their makeup, and the levels of statistical significance are discussed below.

The competitiveness equation is free from nonlinearity problems, but contained problems with normality and heteroskedasticity. Coefficients on six elemental traits are significantly different from zero at the .05 level. At the .05 level, openness to experience, agreeability, material needs, arousal needs, and physical/body needs are significant. All significant elemental traits have a positive effect on competitiveness except agreeability. Agreeability is negatively related to competitiveness, which means that a more agreeable person tends to be less likely to be competitive.

Table 2. Regression results for the compound traits

Compound Trait	Elemental Trait	Coefficient	Stnd error	P-value	F-value	R^2
Competitiveness	Intercept	2.18703	0.65394	0.0009	27.38*	0.3911
	Introversion	-0.04214	0.04928	0.3931		
	Conscientiousness	0.07217	0.05482	0.1889		
	Openness to Experience	0.11139	0.05181	0.0322**		
	Agreeability	-0.29306	0.06762	<.0001**		
	Neuroticism	0.00246	0.04971	0.9606		
	Material needs	0.10244	0.04993	0.0410**		
	Need for arousal	0.48122	0.05321	<.0001**		
	Physical/body needs	0.12756	0.05074	0.0124**		
Testing procedures	Normality			<0.10		
	Nonlinearity			0.2826		
	Heteroskedasticity			0.0983		
Altruism	Intercept	1.26495	0.48021	0.0088	20.17*	0.3212
	Introversion	-0.03343	0.03619	0.3563		
	Conscientiousness	0.00743	0.04026	0.8536		
	Openness to Experience	0.07032	0.03804	0.0654*		
	Agreeability	0.53907	0.04966	<.0001**		
	Neuroticism	0.04573	0.0365	0.2112		
	Material needs	-0.01067	0.03667	0.7711		
	Need for arousal	0.06825	0.03907	0.0816*		
	Physical/body needs	0.07173	0.03726	0.0550*		
Testing procedures	Normality			0.079		
	Nonlinearity			0.042		
	Heteroskedasticity			0.0018		
Need for learning	Intercept	2.31963	0.51541	<.0001	18.24*	0.2997
	Introversion	-0.04975	0.03884	0.2011		
	Conscientiousness	0.08612	0.04321	0.0471**		
	Openness to Experience	0.25178	0.04083	<.0001**		
	Agreeability	0.12562	0.0533	0.0190**		
	Neuroticism	-0.02166	0.03918	0.5807		
	Material needs	0.0297	0.03935	0.4509		
	Need for arousal	0.12886	0.04194	0.0023**		
	Physical/body needs	0.12951	0.03999	0.0013**		
Testing procedures	Normality			0.025		
	Nonlinearity			0.8751		
	Heteroskedasticity			0.9842		
Activity needs	Intercept	2.56686	0.65903	0.0001	12.64*	0.2287
	Introversion	-0.17052	0.04967	0.0007**		
	Conscientiousness	0.08489	0.05525	0.1253		
	Openness to Experience	0.09821	0.05221	0.0608*		
	Agreeability	0.23717	0.06815	0.0006**		
	Neuroticism	0.02363	0.0501	0.6372		
	Material needs	0.02248	0.05032	0.6553		
	Need for arousal	0.05015	0.05362	0.3503		
	Physical/body needs	0.25402	0.05113	<.0001**		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.4223		
	Heteroskedasticity			0.1295		

Table 2. Regression results for the compound traits (continued)

Compound Trait	Elemental Trait	Coefficient	Stnd error	P-value	F-value	R^2
Self-efficacy	Intercept	3.27082	0.5657	<.0001	24.42*	0.3643
	Introversion	-0.17894	0.04263	<.0001**		
	Conscientiousness	0.19105	0.04742	<.0001**		
	Openness to Experience	0.18276	0.04481	<.0001**		
	Agreeability	0.03704	0.0585	0.527		
	Neuroticism	-0.10601	0.043	0.0142**		
	Material needs	0.03484	0.04319	0.4204		
	Need for arousal	0.04852	0.04603	0.2926		
	Physical/body needs	0.2515	0.04389	<.0001**		
Testing procedures	Normality			0.078		
	Nonlinearity			0.7726		
	Heteroskedasticity			0.5828		
Poetry	Intercept	2.5341	0.65206	0.0001	15.37*	0.265
	Introversion	-0.05951	0.04914	0.2267		
	Conscientiousness	-0.1528	0.05466	0.0055**		
	Openness to Experience	0.43388	0.05166	<.0001**		
	Agreeability	0.07285	0.06743	0.2807		
	Neuroticism	-0.11433	0.04957	0.0217**		
	Material needs	0.082	0.04979	0.1005		
	Need for arousal	0.0405	0.05305	0.4458		
	Physical/body needs	0.0963	0.05059	0.0578*		
Testing procedures	Normality			>0.150		
	Nonlinearity			0.6609		
	Heteroskedasticity			0.1066		
Voluntary	Intercept	1.6452	0.6991	0.0192	10.23*	0.1935
	Introversion	-0.11561	0.05269	0.0289**		
	Conscientiousness	-0.02597	0.05861	0.658		
	Openness to Experience	0.15658	0.05538	0.0050**		
	Agreeability	0.23179	0.07229	0.0015**		
	Neuroticism	-0.10762	0.05314	0.0436**		
	Material needs	0.07861	0.05338	0.1418		
	Need for arousal	0.13534	0.05688	0.0179**		
	Physical/body needs	0.15705	0.05424	0.0040**		
Testing procedures	Normality			>.150		
	Nonlinearity			0.34		
	Heteroskedasticity			0.7653		
Present thinking	Intercept	2.89515	0.67913	<.0001	7.67*	0.1525
	Introversion	0.1856	0.05118	0.0003**		
	Conscientiousness	-0.19287	0.05693	0.0008**		
	Openness to Experience	-0.02251	0.0538	0.6759		
	Agreeability	0.22696	0.07022	0.0013**		
	Neuroticism	0.1581	0.05162	0.0024**		
	Material needs	0.04533	0.05186	0.3827		
	Need for arousal	0.04647	0.05526	0.401		
	Physical/body needs	-0.04386	0.05269	0.4058		
Testing procedures	Normality			>0.150		
	Nonlinearity			0.8141		
	Heteroskedasticity			0.7703		

* indicates a significance at .10 ** indicates significance at .05 Stnd error is standard error

The altruism equation is free of normality issues, but contained problems with nonlinearity and heteroskedasticity. Coefficients on four elemental traits are significantly different from zero at the .10 level or below. At the .05 level, the trait of agreeability is positively significant. At the .10 level, the three traits of openness to experience, need for arousal, and physical/body needs are significant. Altruism is positively related to three traits.

The linear equation for need for learning was free of heteroskedasticity, nonlinearity issues, but contained problems with normality. Coefficients on six elemental traits are significantly different from zero at the .10 level or below. Conscientiousness, openness to experience, agreeability, need for arousal, and physical/body needs are significant at the .05 rejection level. The five elemental traits indicated at the .05 level are positively related to need for learning, which means that a person who is more conscientious, open to experience, more agreeable, and have higher needs for arousal and physical/body people tend to be more concerned about learning.

Activity needs as a linear function of the elemental traits has problems with normality, but is free of nonlinearity and heteroskedasticity issues. Coefficients on five elemental traits are significantly different from zero at the .10 level or below. At the .05 level, three traits are significant. Introversion has a negative coefficient while agreeability and physical/body needs have positive coefficients. At the .10 level, openness to experience is significant the trait having a positive coefficient.

Self-efficacy as a linear function of the elemental traits has free from normality, nonlinearity and heteroskedasticity problems. Five elemental traits have coefficients that are significantly different from zero at the .05 level. The five traits are introversion,

conscientiousness, openness to experience, neuroticism, and physical/body needs. Introversion and neuroticism have negative coefficients, which means that an introverted, neurotic person tends to have less self-efficacy issues.

A linear formation for poetry produces a regression lacking issues with heteroskedasticity, nonlinearity, and normality. Coefficients on four elemental traits are significantly different from zero at the .10 level or below. At the .05 level, conscientiousness, openness to experience, and neuroticism pass the test. Conscientiousness and neuroticism have negative coefficients, which means that a more conscientious and neurotic person will tend to be less involved with poetry. At the .10 level, physical/body needs trait is significant with a positive coefficient.

A linear function of the voluntary trait is composed to form a regression free of the problems associated with heteroskedasticity, nonlinearity, and normality. Coefficients on six elemental traits are significantly different from zero at the .10 level or below. At the .05 level, introversion, openness to experience, agreeability, neuroticism, need for arousal, and physical/body are significant. Introversion and neuroticism are the only traits having negative coefficients, which means that more introverted, neurotic people tend to be less likely to volunteer.

The present thinking regression is free of heteroskedasticity, nonlinearity, and normality problems. Coefficients on four elemental traits are significantly different from zero at the .05 level. At this level, the traits of introversion, conscientiousness, agreeability, and neuroticism are significant. Introversion, agreeability, and neuroticism have positive coefficients. The coefficient of conscientiousness is negative, which means that a more conscientious person is less of a present thinker.

Situational Traits

The makeup of the situational traits is estimated in much the same way as the compound traits. Linear regressions are estimated to determine the link between the compound traits and the situational traits in a fully mediated model. The table below displays each situational trait and the compound traits. All but one of the situational trait equations have normality issues making interpretation of the coefficients difficult. Several of the equations have only one significant coefficient.

According to the regression and the p-values compared to the rejection region, several compound traits are significant in the equations for the situational traits. The equations for the situational traits and the levels of significance of the compound traits are discussed below.

A linear regression of the seers (predictors) equation is free of heteroskedasticity and nonlinearity, but had problems associated with normality. The coefficient on poetry was significantly different from zero at the .05 level. Poetry has a positive coefficient, which means that a more poetic person believes in seers or predictors.

The dependent sports interest equation has normality problems, but is free of heteroskedasticity and nonlinearity. The competitiveness trait has a coefficient significantly different from zero at the .05 level. Competitiveness has a positive coefficient, which means that more competitive people have an interest in sports.

The astrology equation is free of heteroskedasticity and nonlinearity issues, but has problems with normality. Poetry has a coefficient significantly different from zero at the .05 level. This indicates that more poetic people are interested in astrology.

Table 3. Regression results for situational traits

Situational Traits	Compound traits	Coefficient	Stnd error	P-value	F-value	R^2
Seers/predictors	Intercept	2.54396	0.52606	<.0001	3.56*	0.077
	Competitiveness	0.00845	0.04496	0.8511		
	Altruism	-0.01588	0.07187	0.8252		
	Need for learning	0.05243	0.07577	0.4895		
	Activity needs	-0.02974	0.05453	0.5859		
	Self-efficacy	-0.03488	0.0601	0.562		
	Poetry	0.21621	0.05285	<.0001**		
	Voluntary	0.02462	0.05178	0.6347		
	Present thinking	-0.03905	0.04867	0.4228		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.2618		
	Heteroskedasticity			0.6423		
Sports interest	Intercept	1.67976	0.61159	0.0063	8.46*	0.1656
	Competitiveness	0.35066	0.05226	<.0001**		
	Altruism	0.01954	0.08356	0.8152		
	Need for learning	-0.00097104	0.08809	0.9912		
	Activity needs	0.08399	0.0634	0.1861		
	Self-efficacy	0.05706	0.06987	0.4147		
	Poetry	-0.07124	0.06144	0.2471		
	Voluntary	-0.00817	0.06019	0.8922		
	Present thinking	-0.04342	0.05658	0.4434		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.661		
	Heteroskedasticity			0.2476		
Astrology	Intercept	1.9257	0.52503	0.0003	2.07	0.0464
	Competitiveness	-0.01403	0.04487	0.7548		
	Altruism	-0.05738	0.07173	0.4243		
	Need for learning	-0.01466	0.07563	0.8464		
	Activity needs	0.04961	0.05442	0.3627		
	Self-efficacy	-0.02365	0.05998	0.6937		
	Poetry	0.16713	0.05275	0.0017**		
	Voluntary	0.03646	0.05168	0.481		
	Present thinking	0.0354	0.04857	0.4667		
Testing procedures	Normality			<.010		
	Nonlinearity			0.8756		
	Heteroskedasticity			0.3722		
Gambling interest	Intercept	1.52642	0.43361	0.005	2.88	0.0632
	Competitiveness	0.15761	0.03706	<.0001**		
	Altruism	0.05605	0.05924	0.3448		
	Need for learning	-0.01718	0.06246	0.7834		
	Activity needs	0.03692	0.04495	0.412		
	Self-efficacy	-0.10221	0.04954	0.0398**		
	Poetry	0.01356	0.04356	0.7557		
	Voluntary	-0.03668	0.04268	0.3907		
	Present thinking	0.0358	0.04012	0.3728		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.5214		
	Heteroskedasticity			0.6433		

Table 3. Regression results for situational traits (continued)

Situational Traits	Compound traits	Coefficient	Stnd error	P-value	F-value	R^2
Athleticism	Intercept	0.74469	0.50415	0.1406	9.95*	0.1893
	Competitiveness	0.29631	0.04308	<.0001**		
	Altruism	0.0353	0.06888	0.6086		
	Need for learning	0.03722	0.07262	0.6086		
	Activity needs	0.03161	0.05226	0.5456		
	Self-efficacy	0.07864	0.0576	0.173		
	Poetry	0.01358	0.05065	0.7887		
	Voluntary	-0.0624	0.04962	0.2094		
	Present thinking	-0.05162	0.04664	0.2692		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.6129		
	Heteroskedasticity			0.586		
Belief in science	Intercept	2.89178	0.48081	<.0001	3.53*	0.0764
	Competitiveness	0.03798	0.04109	0.356		
	Altruism	-0.06093	0.06569	0.3543		
	Need for learning	0.25354	0.06926	0.0003**		
	Activity needs	-0.01722	0.04984	0.73		
	Self-efficacy	0.03432	0.05493	0.5326		
	Poetry	0.00756	0.0483	0.8757		
	Voluntary	-0.0104	0.04732	0.8262		
	Present thinking	0.03047	0.04448	0.4938		
Testing procedures	Normality			0.048		
	Nonlinearity			0.6755		
	Heteroskedasticity			0.0007		
Retirement	Intercept	3.19808	0.55055	<.0001	9.42*	0.181
	Competitiveness	0.00501	0.04705	0.9153		
	Altruism	0.06876	0.07522	0.3613		
	Need for learning	0.01578	0.0793	0.8424		
	Activity needs	-0.01982	0.05707	0.7286		
	Self-efficacy	0.17368	0.0629	0.0061**		
	Poetry	-0.02411	0.05531	0.6632		
	Voluntary	0.1281	0.05419	0.0186**		
	Present thinking	-0.27838	0.05093	<.0001**		
Testing procedures	Normality			>0.150		
	Nonlinearity			0.1597		
	Heteroskedasticity			0.0881		
Sports fan	Intercept	2.59175	0.65005	<.0001	2.77	0.061
	Competitiveness	0.16799	0.05555	0.0027**		
	Altruism	-0.01361	0.08881	0.8783		
	Need for learning	0.10097	0.09363	0.2816		
	Activity needs	-0.13451	0.06738	0.0467**		
	Self-efficacy	0.07127	0.07427	0.3379		
	Poetry	-0.05327	0.0653	0.4152		
	Voluntary	0.08087	0.06398	0.2071		
	Present thinking	0.0502	0.06014	0.4044		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.6254		
	Heteroskedasticity			0.0129		

Table 3. Regression results for situational traits (continued)

Situational Traits	Compound traits	Coefficient	Stnd error	P-value	F-value	R^2
Belief in superstition	Intercept	1.79814	0.42634	<.0001	2.14	0.0477
	Competitiveness	0.0722	0.03643	0.0483**		
	Altruism	-0.0139	0.05825	0.8115		
	Need for learning	-0.14654	0.06141	0.0176**		
	Activity needs	0.01512	0.04419	0.7324		
	Self-efficacy	-0.03582	0.04871	0.4626		
	Poetry	0.00388	0.04283	0.9278		
	Voluntary	0.10242	0.04196	0.0152**		
	Present thinking	0.05026	0.03944	0.2034		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.7473		
	Heteroskedasticity			0.5241		
Fashion interest	Intercept	0.30036	0.4336	0.489	6.49*	0.1322
	Competitiveness	0.14763	0.03705	<.0001**		
	Altruism	0.0973	0.05924	0.1014		
	Need for learning	-0.04633	0.06245	0.4587		
	Activity needs	0.06489	0.04495	0.1497		
	Self-efficacy	0.08068	0.04954	0.1043		
	Poetry	0.04432	0.04356	0.3096		
	Voluntary	0.03028	0.04268	0.4785		
	Present thinking	-0.00369	0.04011	0.9268		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.2009		
	Heteroskedasticity			0.63		
auto innovativeness interest	Intercept	1.51691	0.44206	0.0007	3.72*	0.0802
	Competitiveness	0.16599	0.03778	<.0001**		
	Altruism	-0.03931	0.06039	0.5156		
	Need for learning	0.00089482	0.06367	0.9888		
	Activity needs	0.04933	0.04582	0.2824		
	Self-efficacy	-0.00411	0.0505	0.9352		
	Poetry	-0.02387	0.04441	0.5913		
	Voluntary	0.03481	0.04351	0.4242		
	Present thinking	-0.01022	0.0409	0.8028		
Testing procedures	Normality			<0.010		
	Nonlinearity			0.1158		
	Heteroskedasticity			0.4376		
travel innovativeness interest	Intercept	2.02877	0.4924	<.0001	7.58*	0.151
	Competitiveness	0.13745	0.04208	0.0012**		
	Altruism	-0.13751	0.06727	0.0417**		
	Need for learning	0.19275	0.07093	0.0069**		
	Activity needs	0.12352	0.05104	0.0160**		
	Self-efficacy	-0.10111	0.05626	0.0732*		
	Poetry	0.09371	0.04947	0.0590*		
	Voluntary	0.04754	0.04846	0.3273		
	Present thinking	-0.00072206	0.04555	0.9874		
Testing procedures	Normality			0.083		
	Nonlinearity			0.6304		
	Heteroskedasticity			0.4759		

* indicates a significance at .10 ** indicates significance at .05 Stnd error is standard error

A linear regression of the gambling equation is non-normal without heteroskedasticity or nonlinearity problems. Two traits have coefficients significantly different from zero at the .05 level. At this level, competitiveness and self-efficacy are significantly. Competitiveness has a positive coefficient and self-efficacy has a negative coefficient.

The athlete equation is non-normal lacking problems with heteroskedasticity and nonlinearity. Two traits have coefficients significantly different from zero at the .05 level. Competitiveness is significant with a positive coefficient at the .05 level.

A linear regression of the science equation does not have problems with normality or nonlinearity, but has issues with heteroskedasticity. The need for learning has a coefficient that is significantly different from zero at the .05 level. The positive need for learning coefficient means that individuals with a need for learning are interested in science.

Retirement's linear regression is free of normality and nonlinearity concerns, but contains heteroskedasticity issues. Three compound traits have coefficients that are significantly different from zero at the .05 level. The self-efficacy, voluntary, and present thinking traits are significantly different from zero. The self-efficacy and voluntary traits have positive coefficients, while present thinking has a negative coefficient. Thus people who are volunteer more, have high self-efficacy, and are not present thinkers are more concerned about retirement.

A linear regression of the sports fan equation does not have nonlinearity problems, but faces normality and heteroskedasticity issues. At the .05 level, two compound traits have coefficients that are significantly different from zero.

Competitiveness is significant with a positive coefficient. Activity needs is significant with a negative coefficient. More competitive people with less activity needs are more likely to be fans.

The superstition equation does not face nonlinearity and heteroskedasticity problems, but has issues with normality. Two compound traits are significantly different from zero at the .05 level. The need for learning has a negative coefficient and is significant. The voluntary trait and competitiveness are significant with positive coefficients. People with a higher need for learning, less desire to volunteer, and are more competitive are superstitious.

A linear regression of the fashion equation has problems with normality, but not with heteroskedasticity or nonlinearity. One compound trait has a coefficient that is significantly different from zero at the .05 level. At this level, competitiveness is significant with a positive coefficient.

The auto innovativeness equation has problems with normality, but not with heteroskedasticity or nonlinearity. One compound trait has a coefficient that is significantly different from zero at the .05 level. Competitiveness is significant with a positive coefficient. More competitive people are concerned about auto innovativeness.

A linear regression of the travel innovativeness equation is free of normality, heteroskedasticity, and nonlinearity issues. Six compound traits have coefficients significantly different from zero at the .10 level or below. At the .05 level, the traits of competitiveness, altruism, need for learning, and need for activity are significant. All four traits have positive coefficients excluding altruism. At the .10 level, the self-efficacy and poetry traits are significant. Self-efficacy has a negative coefficient while

poetry has a positive coefficient. More competive, more poetic, less altruistic individuals with high needs for learning and activity and less self-efficacy influence are concerned about travel innovativeness.

Surface Trait

There is only one surface trait studied in this thesis. Both a fully mediated model and a partially mediated model are estimated. The tables below indicate the surface trait, the independent variables used in the regression, the coefficients, the f-values, the R^2, and the significance. Following each individual table is a discussion of the method used and the significant variables in the regression.

Table 4. Regression results for the surface trait based on a fully mediated model

Surface Trait	Independent Variables	Coefficient	Stnd error	P-value	F-value	R^2
Bioengineered interest	Intercept	4.05249	0.35949	<.0001	2.18	0.0721
	Seers	-0.02716	0.06474	0.6751		
	Sportfun	0.02032	0.05702	0.7218		
	Astrology	0.0835	0.07075	0.2388		
	Gamble	-0.11383	0.06566	0.0839*		
	Athlete	0.00712	0.067	0.9154		
	Science	-0.04031	0.05485	0.463		
	Retire	-0.13965	0.04442	0.0018**		
	Fan	0.07896	0.04488	0.0794*		
	Superstition	0.03227	0.06863	0.6386		
	Fashion	0.1144	0.06331	0.0717*		
	auto innovativeness interest	0.06819	0.06979	0.3292		
	travel innovativeness interest	-0.04221	0.05403	0.4352		
Testing procedures	Normality			0.031		
	Nonlinearity			0.8884		
	Heteroskedasticity			0.0329		

* indicates a significance at .10
** indicates significance at .05
Stnd error is standard error

The path diagram below shows the interaction of the traits from regression of the surface bioengineered product interest trait to the elemental traits of impact. Along with the trait interaction is the positive or negative impact between the traits.

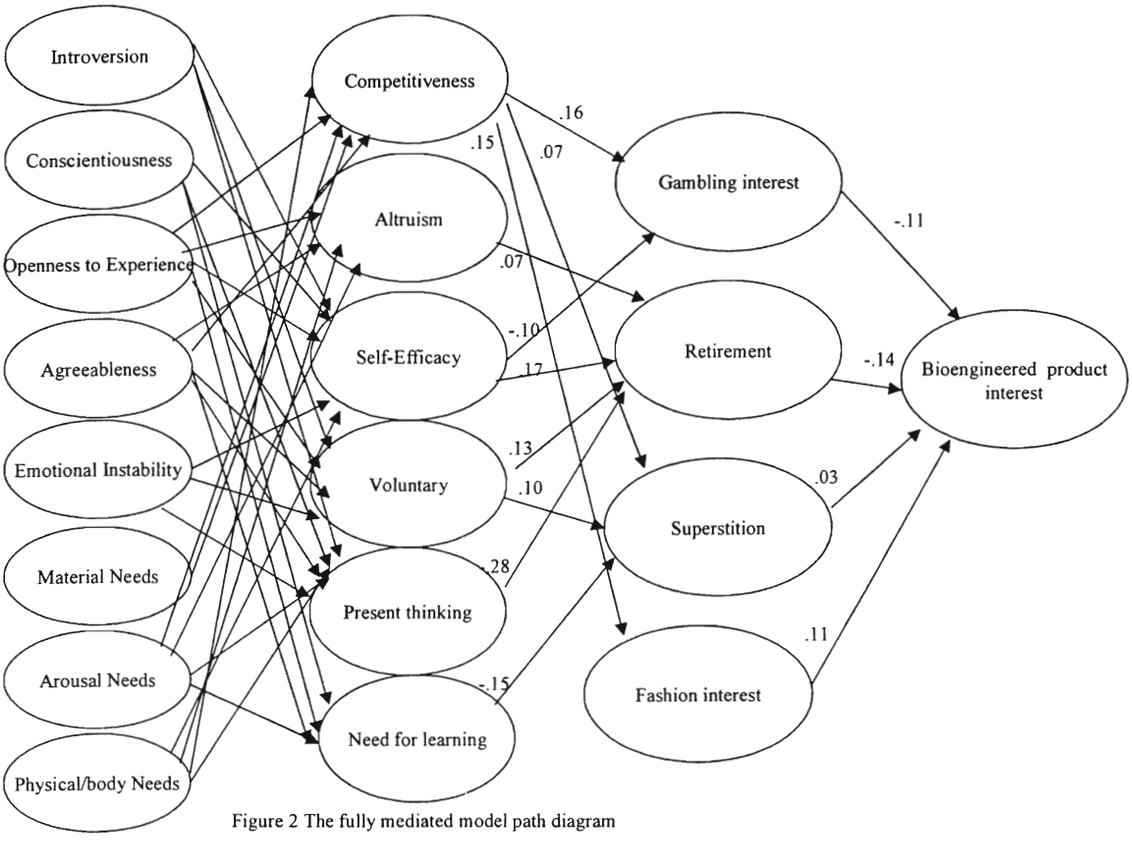

Figure 2 The fully mediated model path diagram

The fully mediated model for bioengineered product interest has problems with normality and heteroskedasticity, but not with nonlinearity. Three situational traits have coefficients that are significantly different from zero at the .10 level or below. The gambling, retirement, fashion interest, and sports fan traits are significant. Gambling and retirement have negative coefficients while fashion interest and sports fan have positive coefficients. People with a negative response towards bioengineered products are deemed to less likely to gamble, more worried about retirement, more interested in fashion, and more likely to be a sports fan.

Estimation of the Partially Mediated Model

A partially mediated model with additional demographics is estimated. The regression is free of the problems associated with heteroskedasticity, nonlinearity, and normality. Shown in Table 6 below are the results of the partially mediated linear regression.

Table 5. Regression results for the surface trait based on a partially mediated model

Surface Trait	Independent Variables	Coefficient	Stnd error	P-value	F-value	R^2
Bioengineered interest	Intercept	2.82799	0.53087	<.0001	4.77*	0.1764
	Seers	-0.03373	0.04918	0.4933		
	Gamble	-0.07745	0.06243	0.2156		
	Science	-0.05687	0.05198	0.2747		
	Retirement	-0.10401	0.04764	0.0297**		
	Fan	0.08969	0.0393	0.0231**		
	Superstition	0.06927	0.06058	0.2536		
	auto innovativeness interest	0.11664	0.06285	0.0644*		
	education	-0.38388	0.18478	0.0385**		
	income	-0.01271	0.01339	0.3431		
	kids	0.24756	0.15939	0.1213		
	Conscientiousness	-0.05274	0.04421	0.2337		
	Body	0.17758	0.04217	<.0001**		
	Compete	-0.05953	0.03871	0.125		
	Poetry	0.15205	0.04193	0.0003**		
	Present	0.10799	0.04343	0.0134**		
Testing procedures	Normality			>0.150		
	Nonlinearity			0.6894		
	Heteroskedasticity			0.6562		

* indicates a significance at .10
** indicates significance at .05
Stnd error is standard error

The path diagram below shows traits and demographics that are significant in the determination of the surface bioengineered product interest trait. Along with the trait interaction is the positive or negative impact of the relationship.

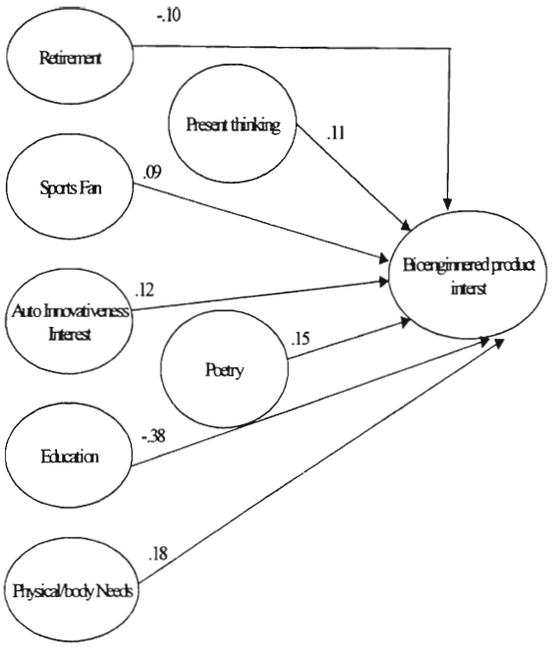

Figure 4. Path diagram for partially mediated model

The regression originally contained all twenty-eight variables. During the regression process, variables with t values less than .90 were omitted. The final linear regression is free of nonlinearity, normality, and heteroskedasticity issues and has seven variables that have coefficients that are significantly different from zero. At the .05 level, the variables of retirement, sports fan, education, physical/body needs, poetry, and present thinking are significant. Retirement and education have negative coefficients, while the remaining traits have positive coefficients. At the .10 level, auto innovativeness interest is significant with a positive coefficient. The significant elemental trait is the physical/body needs. Physical/body needs is the "need to maintain and enhance the body (Mowen 2000, p.29)." The significant compound traits are poetry and present thinking. Poetry is the ability and desire to express oneself through poetic measures. Present thinking is the realization and focus on today's events. Significant

situational traits are retirement, sports fan, and auto innovativeness interest. Retirement is the focus on tomorrow and the future's events. Sports fan is the desire for individuals to watch sports. Auto innovativeness is the desire to have the newest and best car currently on the market. The other significant coefficient is a demographic variable. According to the linear regression, people that are less concerned with retirement, more of a fan, more interested in auto innovativeness, have less than a college degree in terms of education, have higher physical/body needs, more poetic, and more of a present thinker have more of a negative response towards bioengineered products.

In moving from a fully mediated to a partially mediated model, the model is free of the specification problems. The fully mediated model counting for all traits from the elemental to the situational traits that compose the bioengineered product interest response have eighteen traits of significance. The partially mediated model has seven significant coefficients. In analyzing the models fit, there is significant evidence to show that the partially mediated model is a better fitting model.

CHAPTER 4

SUMMARY AND CONCLUSIONS

Genetically modified foods have evolved and increased in production. Currently over fifty genetically modified food sources have been permitted for production and commercialization. Billions of research and development dollars are being spent on genetically modified foods, but some consumers have yet to decide whether they desire to purchase the products or not. Some consumers and some governments across the world are expressing some concern about the production methods and genetic modification of food sources. Some governments have proposed bans on the importation of goods containing genetically modified organisms. Since the science of genetic modification is roughly a decade old, questions as to the alterations that could occur in nature, the methods of production, and the safety of the new products are not answerable at this time.

As the issues are emerging and increasing, research has escalated about the acceptance, limitations, and knowledge of genetically modified foods. Research has yet to determine what personality traits cause reactions or concerns towards genetically modified foods. The factors underlying consumer concern need to be addressed and evaluated. The objective of the research is to determine which consumer's personality traits and characteristics are positively or negatively related to fear of food products made from genetically modified organisms.

In determining the characteristics causing the reactions to the foods products, fully mediated and partially mediated models are evaluated. The partially mediated model is shown to be significantly better model than the fully mediated model.

Statistical problems in estimating the fully mediated model make the fully mediated model difficult to interpret. The fully mediated model has eighteen significant variables. Individuals who fear bioengineered products are less likely to gamble and to be concerned about retirement. Fearful individuals are more likely to be superstitious and to be interest in fashion. The unlikely gamblers are less competitive, which means they are less open to experience, more agreeable, and have lower material, arousal, and physical/body needs. These same gamblers desire more control, are more extroverted, more conscientious, more open to try new experiences, less emotionally stable, and have higher physical/body needs. Unconcerned retirement individuals feel less in control, volunteer less, and are more of a present thinker. The individuals feeling less in control are more introverted, less conscientious, less open to try new experiences, more emotionally unstable, and have lower physical/body needs. The less volunteering individuals are more introverted, less open to try new experiences, less agreeable, more emotionally unstable, and have lower arousal and physical/body needs. The more present thinking individuals are more introverted, less conscientious, more agreeable, and more emotionally unstable. More superstitious individuals are more competitive, volunteer more, and have higher needs for information. The competitive individuals are more open to try new experiences, less agreeable, and have more arousal, material, and physical/body needs. The more volunteering individuals are more introverted, more open to try new experiences, more agreeable, less emotionally unstable, and have higher arousal and physical/body needs. The information seeking individuals are less conscientious, less open to try new experiences, less agreeable, and have less arousal and physical/body needs. The fashion interested individuals are more competitive. The

competitive fashion seekers are open to trying new experiences, less agreeable, and have higher arousal, material, and physical/body needs.

For the partially mediated model, seven of the fifteen variables in the model are significant. The significant variables are sports fan, present thinking, auto innovativenss interest, poetry, retirement, education less than a college degree, and physical/body needs. Based on the partially mediated model, fear of bioengineered food products is found to be positively related to:

1. present thinking;
2. sports fan;
3. auto innovativeness interest;
4. poetry; and
5. physical/body needs.

Fear of bioengineered products is found to be negatively related to:

1. retirement; and
2. education less than a college degree.

Limitations

The data was obtained on 354 individuals across the nation in a random sample deemed to be representative of the demographic characteristics of the United States. As this is a relatively small random sample of the entire population, a second random sample could aid in the analysis of the consumer traits. More research on significant demographic variables and situational trait inclusion could impact the understanding of consumer attitudes towards genetically modified foods. The data in this study do not

contain information about the respondents level of knowledge or understanding of genetic modification technology or processes.

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APPENDIX

CONSUMER MAIL PANEL

(W765-01)

Survey of Consumer Motivation and Lifestyle

Dear Panel Member:

I would like you to complete a survey on what motivates your various activities. After answering these questions, please return the completed survey to me in the postage-paid envelope provided. Please answer all questions. Your answers are very important to my study. Thank you so much for your participation.

Sincerely,

Marie

1. Please "check" the number that best describes how frequently you feel or act in the manner described in your professional, leisure, and home lives. There are no right or wrong answers. Just "check" the response that most accurately describes how you feel or act in your daily life, not how you wish you would act.
("X" ONE BOX FOR EACH STATEMENT BELOW)

How often do you feel/act this way?

("X" one box for each statement below)	Never								Always	
Feel bashful more than others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(77)
Introverted	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Quiet when with people	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Shy	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Precise	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(78)
Efficient	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Organized	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Orderly	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Frequently feel highly creative	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(79)
Imaginative	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Find novel solutions	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
More original than others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Tender hearted with others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(80)
Agreeable with others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Kind to others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Softhearted	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Moody more than others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(81)
Temperamental	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Touchy	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Emotions go way up and down	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Enjoy buying expensive things	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(82)
Like to own nice things more than most people	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Acquiring valuable things is important to me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Enjoy owning luxurious things	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Drawn to experiences with an element of danger	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(83)
Seek an adrenaline rush	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Actively seek out new experiences	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Enjoy taking more risks than others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Focus on my body and how it feels	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(84)
Devote time each day to improving my body	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Feel that making my body look good is important	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Work hard to keep my body healthy	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Enjoy competition more than others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(85)
Feel that it is important to outperform others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Enjoy testing my abilities against others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Feel that winning is extremely important	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	

How often do you feel/act this way?

	Never								Always	
Giving to others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(83)
Sacrifice my goals to help others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Selfless in giving time to others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Altruistic	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(84)
Enjoy learning new things more than others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
People consider me to be intellectual	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Enjoy working on new ideas	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Information is my most important resource	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Keep really busy doing things	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(85)
Try to cram as much as possible into a day	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Extremely active in my daily life	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Always like to be doing something	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
I feel in control of what is happening to me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(86)
Once I make up my mind, I can reach my goals	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
I feel like I have a great deal of willpower	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
When I make a decision, I can carry it out	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Poetry is extremely important to mankind	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(87)
I consider myself to be a highly artistic person	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
I have a very strong appreciation for the beauty of words	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
The theater is critical to culture	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
										(Hole 91)
Identify community problems and do something to help	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(10)
Working for my community is essential for me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Volunteer to provide needed services for my community	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
Helping non-profit groups is extremely important to me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
The distant future is too uncertain to plan for	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	(11)
I pretty much live on a day-to-day basis	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
The future seems very vague and uncertain to me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	
I focus on the present much more than the future	☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐8	☐9	

2. For the next set of items, please indicate the extent that you disagree or agree with each.
("X" ONE BOX FOR EACH STATEMENT BELOW)

	Strongly Disagree			Neutral			Strongly Agree	
("X" ONE BOX FOR EACH STATEMENT BELOW)								
There are people who can predict the future	☐1	☐2	☐3	☐4	☐5	☐6	☐7	(12)
What happens to people can be foretold in advance	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
There are ways to know the future	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
Participating as a player in sports is fun for me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	(13)
Playing sports is extremely appealing to me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
Playing sports is really exciting for me	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
Astrology can predict the future	☐1	☐2	☐3	☐4	☐5	☐6	☐7	(14)
One's personality is determined by astrological alignments	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
Your birth date impacts your future	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
The stars, planets, and our birthdays affect our destiny	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
I really enjoy gambling for money	☐1	☐2	☐3	☐4	☐5	☐6	☐7	(15)
Whenever I have the opportunity, I will make a bet	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
I frequently make wagers with others	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
I am skilled in the art of gambling	☐1	☐2	☐3	☐4	☐5	☐6	☐7	
Overall, I am a better athlete than others my age	☐1	☐2	☐3	☐4	☐5	☐6	☐7	(16)
I have always been skilled as an athlete	☐1	☐2	☐3	☐4	☐5	☐6	☐7	

("X" ONE BOX FOR EACH STATEMENT BELOW)	STRONGLY DISAGREE			NEUTRAL			STRONGLY AGREE
From a young age I have been good at sports	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I strongly believe that science explains nature	☐1	☐2	☐3	☐4	☐5	☐6	☐7
Through science a better world can be created	☐1	☐2	☐3	☐4	☐5	☐6	☐7
The scientific method is the best approach for knowing how things work	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I am (we are) saving enough to retire comfortably	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I know how much money I (we) need to retire comfortably	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I (we) have a financial plan that will take care of retirement	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I am confident that I am (we are) saving enough for retirement	☐1	☐2	☐3	☐4	☐5	☐6	☐7
Watching sports as a fan is fun for me	☐1	☐2	☐3	☐4	☐5	☐6	☐7
Being a sports fan tells others much about me	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I really enjoy being a spectator at sporting events	☐1	☐2	☐3	☐4	☐5	☐6	☐7
Black cats can bring bad luck	☐1	☐2	☐3	☐4	☐5	☐6	☐7
If you break a mirror, you will have bad luck	☐1	☐2	☐3	☐4	☐5	☐6	☐7
The number "13" is unlucky	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I am a superstitious person	☐1	☐2	☐3	☐4	☐5	☐6	☐7
The genetic engineering of foods is a serious threat	☐1	☐2	☐3	☐4	☐5	☐6	☐7
Biotechnology will do more harm than good	☐1	☐2	☐3	☐4	☐5	☐6	☐7
Genetically modified foods should be banned until their safety is proven	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I would pay 25% more for a food product guaranteed NOT to contain genetically modified ingredients	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I am aware of fashion trends and want to be one of the first to try them	☐1	☐2	☐3	☐4	☐5	☐6	☐7
It is important to me to be a fashion leader	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I am confident in my ability to recognize fashion trends	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I am the first to try new fashions	☐1	☐2	☐3	☐4	☐5	☐6	☐7
In general, I am among the first in my circle of friends to buy a new model car when it comes out	☐1	☐2	☐3	☐4	☐5	☐6	☐7
Compared to my friends, I have owned a lot of different cars	☐1	☐2	☐3	☐4	☐5	☐6	☐7
If I hear about a new model car in showrooms, I would be interested enough to go look at it	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I like owning a car that I can show off to others	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I enjoy traveling to unusual places	☐1	☐2	☐3	☐4	☐5	☐6	☐7
The idea of adventure travel is appealing to me	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I do (would) like to travel to third world countries	☐1	☐2	☐3	☐4	☐5	☐6	☐7
I like to show off a little by telling others about my travels	☐1	☐2	☐3	☐4	☐5	☐6	☐7

Activity Information

3. On average, how many hours per week do you work for non-profit community organizations in volunteer roles? (PLEASE WRITE IN) _____ Hours

4. In the past 3 years, for how many non-profit organizations have you done volunteer work? (PLEASE WRITE IN) _____ Organizations

5. In the past 3 years, on how many committees have you served for non-profit organizations? (PLEASE WRITE IN) _____ Committees

6. Over the past 5 years, how many times have you held an officer's position in civic/non-profit groups (e.g., president, treasurer, on executive committee)? (PLEASE WRITE IN) _____ Positions

7. How many different foreign countries have you visited on vacations? (PLEASE WRITE IN) _____ Countries

8. How many different cars have you purchased for yourself in the last 10 years? (PLEASE WRITE IN) _____ Cars

9. How often do you go to concerts, art exhibitions, or theater? ("X" ONE BOX ONLY)

ALMOST NEVER	ONCE OR TWICE A YEAR	ABOUT ONCE EVERY 2 MONTHS	ABOUT ONCE A MONTH	2 TO 3 TIMES A MONTH	ABOUT ONCE A WEEK	MORE THAN ONCE PER WEEK
☐1	☐2	☐3	☐4	☐5	☐6	☐7

10. For all sports, "X" the box that indicates how often you participate in matches or games against others? (This excludes social outings in which competition is not present.) ("X" ONE BOX ONLY)

ALMOST NEVER	ONCE OR TWICE A YEAR	ABOUT ONCE EVERY 2 MONTHS	ABOUT ONCE A MONTH	2 TO 3 TIMES A MONTH	ABOUT ONCE A WEEK	MORE THAN ONCE PER WEEK
☐1	☐2	☐3	☐4	☐5	☐6	☐7

11. For all sports, how often do you attend matches or games as a spectator? ("X" ONE BOX ONLY)

ALMOST NEVER	ONCE OR TWICE A YEAR	ABOUT ONCE EVERY 2 MONTHS	ABOUT ONCE A MONTH	2 TO 3 TIMES A MONTH	ABOUT ONCE A WEEK	MORE THAN ONCE PER WEEK
☐1	☐2	☐3	☐4	☐5	☐6	☐7

12. About how much per year do you spend on the purchase of sports equipment? (PLEASE WRITE IN TO THE NEAREST WHOLE DOLLAR AMOUNT) $ _____

13. About how much per year do you spend on the purchase of tickets for sporting events? (PLEASE WRITE IN TO THE NEAREST WHOLE DOLLAR AMOUNT) $ _____

14. How often do you drive at least 10 m.p.h. over the speed limit? ("X" ONE BOX ONLY)

ALMOST NEVER	A FEW TIMES A YEAR	ABOUT ONCE A MONTH	2 TO 3 TIMES A MONTH	ABOUT ONCE A WEEK	2 OR 3 TIMES A WEEK	ALMOST EVERY DAY
☐1	☐2	☐3	☐4	☐5	☐6	☐7

15. Do you currently have a child who is participating in a sport? ("X" ONE BOX)

Yes ☐1 No ☐2

16. In your life, about how many times has astrology influenced a major decision? (PLEASE WRITE IN) Number of times: ____

17. About how frequently does astrology influence you in some way? ("X" ONE BOX ONLY)

NEVER	A FEW TIMES A YEAR	ABOUT ONCE A MONTH	2 TO 3 TIMES A MONTH	ABOUT ONCE A WEEK	2 OR 3 TIMES A WEEK	ALMOST EVERY DAY
☐1	☐2	☐3	☐4	☐5	☐6	☐7

18. About how many times each year do you gamble in any way? ("X" ONE BOX ONLY)

NEVER	A FEW TIMES A YEAR	ABOUT ONCE A MONTH	2 TO 3 TIMES A MONTH	ABOUT ONCE A WEEK	2 OR 3 TIMES A WEEK	ALMOST EVERY DAY
☐1	☐2	☐3	☐4	☐5	☐6	☐7

19. About what is the most that you have ever won gambling? (PLEASE WRITE IN TO NEAREST WHOLE DOLLAR AMOUNT. IF YOU DO NOT GAMBLE, WRITE A "0") $ _____

20. About what is the most that you have ever lost gambling? (PLEASE WRITE IN TO NEAREST WHOLE DOLLAR AMOUNT. IF YOU DO NOT GAMBLE, WRITE A "0") $ _____

21. About how many cigarettes do you smoke each day? (PLEASE WRITE IN. IF YOU DO NOT SMOKE, WRITE A "0") _____ Number smoked

THANKS for completing this questionnaire!

```
dm 'log;clear;output;clear;results;clear;';
options ps=50 ls=70 pageno=1;
goptions reset=global border ftext=swiss gunit=cm htext=0.3 htitle=0.5;
goptions display noprompt;

title 'Molly Brant, consumer response survey';
proc import
datafile= "d:\market facts data worked.xls" DBMS=excel2000 replace
out=one;
getnames=yes;
run;

data set1;
set one;
kids=0;
if (NUMKIDS>0) then kids=1;
edu1=0;
if (EDUCT>5) then edu1=1;
edu2=0;
if (EDUCT>6) then edu2=1;
run;

proc reg data=set1;
proc means;
run;


*Compound traits*;

title2 'Competitiveness';
proc reg data=set1 outest=out_est1;
model COMPETE = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*COMPETE / nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set2  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set2;
var residual;
histogram residual / normal;
run;

data set23;
set set2;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set23;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test1: test pre_square=0;
run;
```

```
Title3 'Test for static heteroscedasticity';
proc reg data=set23;
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test2: test pre_square=0;
run;


title2 'Altruism ';
proc reg data=set1 outest=out_est1;
model ALTRUISM = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*ALTRUISM/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set3  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set3;
var residual;
histogram residual / normal;
run;

data set24;
set set3;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set24;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set24;
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test2: test pre_square=0;
run;


title2 'Need for learning';
proc reg data=set1 outest=out_est1;
model INFO = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY /spec
vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*INFO/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set4  r=residual p=predicted;
run;

Title3 'Test for normality';
```

```
proc univariate data=set4;
var residual;
histogram residual / normal;
run;

data set25;
set set4;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set25;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set25;
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square;
test2: test pre_square=0;
run;

title2 'Activity needs';
proc reg data=set1 outest=out_est1;
model ACTIVE = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY /spec
vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*ACTIVE/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set5  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set5;
var residual;
histogram residual / normal;
run;

data set26;
set set5;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set26;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set26;
```

```
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square;
test2: test pre_square=0;
run;

title2 'Self-efficacy';
proc reg data=set1 outest=out_est1;
model SELFEFF = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*SELFEFF/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set6  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set6;
var residual;
histogram residual / normal;
run;

data set27;
set set6;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set27;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set27;
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square;
test2: test pre_square=0;
run;

title2 'Poetry';
proc reg data=set1 outest=out_est1;
model POETRY = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY /spec
vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*POETRY/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set7  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set7;
var residual;
histogram residual / normal;
run;
```

```
data set28;
set set7;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set28;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set28;
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test2: test pre_square=0;
run;

title2 'Voluntary based on 8 questions';
proc reg data=set1 outest=out_est1;
model VOLUNT = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY /spec
vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*VOLUNT/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set8  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set8;
var residual;
histogram residual / normal;
run;

data set29;
set set8;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set29;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set29;
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test2: test pre_square=0;
run;

title2 'Present thinking';
```

```
proc reg data=set1 outest=out_est1;
model PRESENT = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*PRESENT/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set9  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set9;
var residual;
histogram residual / normal;
run;

data set30;
set set9;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set30;
model residual = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set30;
model res_square = INTROV CONSCI OPEN AGREE UNSTAB MATER AROUSAL BODY
pre_square ;
test2: test pre_square=0;
run;

*Situational traits*;

title2 'SEERS (Predictors)';
proc reg data=set1 outest=out_est1;
model SEERS = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT /spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*SEERS/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set10  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set10;
var residual;
histogram residual / normal;
run;

data set31;
set set10;
res_square = residual*residual;
pre_square = predicted*predicted;
```

```
run;

Title3 'Test for nonlinearity';
proc reg data=set31;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set31;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'SPORT interest';
proc reg data=set1 outest=out_est1;
model SPORTFUN = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*SPORTFUN/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set11  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set11;
var residual;
histogram residual / normal;
run;

data set32;
set set11;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set32;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set32;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;

title2 'ASTROLOGY';
proc reg data=set1 outest=out_est1;
model ASTROLOG= COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
```

```
symbol1 v=dot h=.1 cv=blue;
plot residual.*ASTROLOG/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set12  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set12;
var residual;
histogram residual / normal;
run;

data set33;
set set12;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set33;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set33;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'GAMBLE based on 4 questions';
proc reg data=set1 outest=out_est1;
model GAMBLE = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT /spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*GAMBLE/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set13  r=residual p=predicted h=h;
run;

Title3 'Test for normality';
proc univariate data=set13;
var residual;
histogram residual / normal;
run;

data set34;
set set13;
res_square = residual*residual;
pre_square = predicted*predicted
run;

Title3 'Test for nonlinearity';
proc reg data=set34;
```

```
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set34;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;

title2 'ATHLETE based on 4 questions';
proc reg data=set1 outest=out_est1;
model ATHLETE= COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*ATHLETE/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set14  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set14;
var residual;
histogram residual / normal;
run;

data set35;
set set14;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set35;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set35;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'SCIENCE based on 4 questions';
proc reg data=set1 outest=out_est1;
model SCIENCE= COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*SCIENCE/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set15  r=residual p=predicted;
```

```
run;

Title3 'Test for normality';
proc univariate data=set15;
var residual;
histogram residual / normal;
run;

data set36;
set set15;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set36;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set36;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;

title2 'RETIRE based on 4 questions';
proc reg data=set1 outest=out_est1;
model RETIRE= COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*RETIRE/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set16  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set16;
var residual;
histogram residual / normal;
run;

data set37;
set set16;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set37;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run·
```

```
Title3 'Test for static heteroscedasticity';
proc reg data=set37;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'FAN based on 4 questions';
proc reg data=set1 outest=out_est1;
model FAN = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*FAN/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set17  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set17;
var residual;
histogram residual / normal;
run;

data set38;
set set17;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set38;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set38;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'SUPERST based on 4 questions';
proc reg data=set1 outest=out_est1;
model SUPERST = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*SUPERST/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set18  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set18;
```

```
var residual;
histogram residual / normal;
run;

data set39;
set set18;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set39;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set39;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'FASHION based on 4 questions';
proc reg data=set1 outest=out_est1;
model FASHION = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT /spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*FASHION/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set19  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set19;
var residual;
histogram residual / normal;
run;

data set40;
set set19;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set40;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set40;
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```
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'AUTOINO based on 4 questions';
proc reg data=set1 outest=out_est1;
model AUTOINO = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*AUTOINO/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set20  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set20;
var residual;
histogram residual / normal;
run;

data set41;
set set20;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set41;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set41;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;


title2 'TRAVINOV based on 4 questions';
proc reg data=set1 outest=out_est1;
model TRAVINOV = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT/spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*TRAVINOV/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set21  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set21;
var residual;
histogram residual / normal;
```

```
run;

data set42;
set set21;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set42;
model residual = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set42;
model res_square = COMPETE ALTRUISM INFO ACTIVE SELFEFF POETRY VOLUNT
PRESENT pre_square ;
test2: test pre_square=0;
run;

*Surface Trait*;

title2 'BIOENG based on 4 questions';
proc reg data=set1 outest=out_est1;
model BIOENG = SEERS SPORTFUN ASTROLOG GAMBLE ATHLETE SCIENCE RETIRE
FAN SUPERST FASHION AUTOINO TRAVINOV  /spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*sqrdBIOENG/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set22  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set22;
var residual;
histogram residual / normal;
run;

data set43;
set set22;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set43;
model residual = SEERS SPORTFUN ASTROLOG GAMBLE ATHLETE SCIENCE RETIRE
FAN SUPERST FASHION AUTOINO TRAVINOV pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set43;
model res_square = SEERS SPORTFUN ASTROLOG GAMBLE ATHLETE SCIENCE
RETIRE
```

```
FAN SUPERST FASHION AUTOINO TRAVINOV  pre_square ;
test2: test pre_square=0;
run;

title2 'BIOENG based on 4 questions';
proc reg data=set1 outest=out_est1;
model BIOENG = SEERS GAMBLE SCIENCE RETIRE FAN SUPERST AUTOINO edu2
INCOME kids
CONSCI BODY COMPETE POETRY PRESENT/ spec vif;
symbol1 v=dot h=.1 cv=blue;
plot residual.*BIOENG/ nostat vref=3 cvref=red;
plot residual.*predicted. / nostat vref=0 cvref=red lvref=1;
output out=set22  r=residual p=predicted;
run;

Title3 'Test for normality';
proc univariate data=set22;
var residual;
histogram residual / normal;
run;

data set43;
set set22;
res_square = residual*residual;
pre_square = predicted*predicted;
run;

Title3 'Test for nonlinearity';
proc reg data=set43;
model residual = SEERS GAMBLE SCIENCE RETIRE FAN SUPERST AUTOINO edu2
INCOME kids
CONSCI BODY COMPETE POETRY PRESENT pre_square ;
test1: test pre_square=0;
run;

Title3 'Test for static heteroscedasticity';
proc reg data=set43;
model res_square = SEERS GAMBLE SCIENCE RETIRE FAN SUPERST AUTOINO edu2
INCOME kids
CONSCI BODY COMPETE POETRY PRESENT pre_square ;
test2: test pre_square=0;
run;

quit;
```

Oklahoma State University
Institutional Review Board

Protocol Expires: 7/9/02

Date: Tuesday, July 10, 2001 IRB Application No BU021

Proposal Title: SURVEY OF CONSUMER MOTIVATION AND LIFESTYLE

Principal Investigator(s):

Dr. John Mowen
323 CBA
Stillwater, OK 74078

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Dear PI :

Your IRB application referenced above has been approved for one calendar year. Please make note of the expiration date indicated above. It is the judgment of the reviewer(s) that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved projects are subject to monitoring by the IRB. If you have questions about the IRB procedures or need any assistance from the Board, please contact Sharon Bacher, the Executive Secretary to the IRB, in 203 Whitehurst (phone: 405-744-5700, sbacher@okstate.edu).

Sincerely,

Carol Olson

Carol Olson, Chair
Institutional Review Board

OSU

College of Business Administration
201 Business
Stillwater, Oklahoma 74078-4011
405-744-5064; Fax 405-744-5180

Memorandum

To: Carole Olson, OSU Institutional Review Board

From: John C. Mowen, Regents Professor

Subject: Thesis of Molly Brant

Date: July 1, 2002

Molly Brant is a master's student working under Professor Dan Tilley in the Agricultural Economics Department. Working in conjunction with Dr. Tilley, this past Spring semester I gave Ms. Brant access to a data set that I collected last fall (IRB #BU021, Survey of consumer Motivation and Lifestyle), which she is using as the data for her master's thesis. A series of items in the survey pertain to attitudes regarding consuming genetically modified food, which is the topic of her thesis. (Ms. Brant received only the data from the survey, and had access to no personal identifiers of the respondents. In fact, I do not have any personal identifiers of the respondents.)

It is my understanding that Ms. Brant has been told that her name must be on the IRB application. This was not possible because the data were collected prior to myself meeting her or to my discussions with Dr. Tilley about our mutual interests in consumer responses to genetically modified foods. For Ms. Brant, these are secondary data—not primary data. I should add that she developed her own hypotheses and ran her own data analyses on the data.

Based upon these considerations, I would like to make two recommendations. First, I recommend that Mr. Brant be given a waiver of the requirement to have her name on the IRB application. Second, I recommend that she be given a waiver of the requirement that the title of her thesis be same as that on the IRB application. The survey was developed to measure a variety of consumer behavior concepts. As a result, the title of the IRB is highly generic, and would not provide readers of her thesis with an appropriate understanding of the topic of her thesis.

VITA 2

Molly D. Brant

Candidate for the Degree of

Master of Science

Thesis: CONSUMER RESPONSE TO GENETICALLY MODIFIED FOODS

Major Field: Agricultural Economics

Biographical:

Personal Data: Born in Pawnee, Oklahoma on May 16, 1978, the daughter of Bruce and JoBeth Spears and the late Kenneth Buchanan.

Education: Graduated from Pawnee High School in May 1996; received Bachelor of Science degree in Agricultural Economics and Accounting from Oklahoma State University in July 2000. Completed the requirements for the Master of Science degree with a major in Agricultural Economics at Oklahoma State University in August 2002.

Experience: Raised in an agricultural setting in Pawnee, Oklahoma; employed at Pawnee IGA from 1994-1999; employed as a tutor for Oklahoma State University from 1997-1999; employed as a teaching assistant at Oklahoma State University from 1999-2000; employed as a graduate research assistant at Oklahoma State University, Department of Agricultural Economics, 2000-2002.