CULTURAL IMPACTS ON PUBLIC PERCEPTIONS
OF AGRICULTURAL BIOTECHNOLOGY:
A COMPARISON OF
SOUTH KOREA AND THE UNITED STATES

A Dissertation
by
RICHARD HARRISON NADER

Submitted to the Office of Graduate Studies of Texas A&M University in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY

December 2005

Major Subject: Educational Administration
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Major Subject: Educational Administration
ABSTRACT

Cultural Impacts on Public Perceptions of Agricultural Biotechnology:
A Comparison of South Korea and the United States. (December 2005)

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According to Millar (1996), the gulf between science and society is growing. Technologies are tools cultures develop to solve society’s problems. The rapid dispersion of science and technology across cultural borders through trade, technology transfer and exchange, increasingly requires people in different cultures to make choices about accepting or rejecting artifacts of science and technology such as genetically modified (GM) foods, which originate primarily from the United States.

These issues challenge policy makers and scientists to account for the affects of different cultural perspectives on controversial scientific issues. Given the controversy across cultures over acceptance or rejection of genetically modified (GM) foods, GM foods are an excellent example with which to begin to reveal how culture impacts public perceptions of the risk and benefits of science and technology in different societies.
This research will: 1. Define public awareness and understanding of science, specifically GM foods; 2. Examine culture’s impact on knowledge, including different cultural approaches to research; and 3. Compare recent findings of a bi-national public opinion survey on GM comparing in South Korea and the United States. The proposed research outlines two research questions:

1) How and in what ways do South Koreans and Americans differ in their opinions about GMOs? This question is important for gathering current points of contrast about how the two cultures may differ; and

2) What role does culture play on opinion formation about GM foods?

Through grounded theory, the researcher will investigate how cultural differences help explain opinion on public perceptions of GM foods. Is it possible to identify common cultural factors that impact public perceptions of GM foods between South Koreans and Americans? The study will utilize both qualitative and quantitative methodologies. Higher education is a major producer of new science and technology. The study is significant for higher education administrators who must understand cultural factors impacting science internationally and globalization of the academic enterprise.
DEDICATION

To my son Joshua

No achievement in life is meaningful without you.
You are my greatest teacher.
I love you.
ACKNOWLEDGEMENTS

Much of the credit for my completing this dissertation is due to my chair, Dr. Lincoln, whose timely and cogent advice kept me on track and challenged my thinking. My heartfelt thanks to Dr. Lincoln and my committee members, Dr. Bazer, Dr. Willson and Dr. Stanley, and former committee members, Dr. Corrington, Dr. Carpenter and Dr. Oliva. Each of your insights and expertise was vital to this research.

Additional major contributors include Dr. Bill Hallman, Dr. Susanna Priest, Dr. Rudy Nayga, and Dr. Ho Min Jang. Special thanks go to all who agreed to be interviewed, for giving of your time and thoughts in helping me understand cultural impacts on GM food perceptions. I wish to personally thank Sung Hee, my research partner from Korea. Her insight and perspective in interpreting South Korean culture was precious.

Much of my inspiration for completing this dissertation is due to my family. My deepest thanks go to my wife Kristine for her encouragement and for her care of our three children, Joshua, Sophie and Caroline. Kristine, your gift of love allowed me time to dedicate toward this accomplishment. I am also forever thankful to my father for demonstrating high standards of academic achievement and to my mother for demonstrating how the power of love and compassion leads to the accomplishment of a worthy cause.
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CHAPTER I

INTRODUCTION: PROBLEM AND CONTEXT

Recent scientific and technological breakthroughs in manipulating the genetic code of plants and animals has led to a commercial revolution in crop biotechnology and genetically modified (GM) foods. However, knowledge about how different cultures and societies accept and adapt to changes brought about by rapid development of genetically modified products is less well understood. The present research aims to increase understanding of the complex cultural dynamics of acceptance of GM foods and to compare how two very different cultures come to an opinion about GM food. The researcher will address the problem of what cultural factors may be relevant in perceptions of GM food by focusing on the following three questions:

1. How do South Koreans and Americans perceive GM foods?
2. What role does culture play on opinions about GM foods?
3. Is it possible to identify cultural factors that impact perceptions of GM foods?

Answering these questions will provide a descriptive analysis of how cultural differences may impact perceptions of GM foods.

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This dissertation follows the style of Agriculture and Human Values.
The study will use qualitative interview methodologies, namely grounded theory (Gubrium and Holstein, 2001) which entails: simultaneous data collection and analyses, pursuit of emergent themes, discovery of basic social processes, inductive construction of abstract categories that explain and synthesize these processes, sampling to refine the categories and integration of categories into a “regional” theoretical framework that identifies a number of cultural factors, conditions and bases for opinion formation about GM food in American and South Korean cultures.

Higher education is a major producer of new science and technology. New and potentially controversial scientific developments and the different cultural perspectives that impact acceptance of these technologies as they move across national and cultural borders, challenge the research community, policymakers and participants in the global economy to take culture into account in understanding these issues. The current controversy over acceptance or rejection of genetically modified (GM) food provides an excellent case example with which to begin to reveal how culture impacts perceptions of current technologies which have experienced both positive and negative cultural reactions such as GM food. The study is significant for many disciplines including the fields of science communication, science education, cultural anthropology, science and technology policy and research administration— all of which must grapple with national and cultural differences impacting the growing scale and diffusion of science internationally and globalization of the scientific enterprise.
According to Millar (1996), the gulf between science and society is growing. In the developed and in many developing countries, embracing a scientific culture and other ideas such as free-markets, capitalism, and a democratic system of governance, is recognized (especially the United States) as important to strengthening a society’s ability to effectively participate in a world system that is increasingly science and technology oriented. Technologies are cultural products, or “tools” which are developed to overcome the society’s perceived problems. The rapid dispersion of science and technology across national and cultural borders through trade, technology transfer and information exchange, increasingly requires people in different cultures to make choices about accepting or rejecting technologies such as genetically modified foods- which may have origins in other countries and foreign cultures.

The GM food debate is symbolic of a ‘clash’ between dual values placed in scientific progress and cultural tradition. As described by Thomas Friedman in *The Lexus and the Olive Tree* (2000), the challenge for a nation’s people when presented with this conflict between tradition (roots-of the olive tree) and technology (the Lexus) may be summarized as follows: “The rapid change has challenged social structures, cultural mores…and caused a backlash” (p. 329). The scientific community may view this ‘backlash’ as a rejection of objectivity or rationality. The ‘backlash’ might also be seen by U.S. economic and business interests as an unjustifiable impediment to free trade. The public may perceive the ‘backlash’ to be a true risk to health and welfare, or as limiting free-choices of consumers, or possibly associate western technologies with other
negative connotations of globalization (i.e., unwanted American cultural hegemony or domination).

Genetic modification of foods utilizes recombinant DNA technology. Recombinant DNA technology refers to the process of forming a molecule by joining DNA that displays traits of interest to a vector DNA, in order to create a trait which may be expressed in a different species. For example, GM technology allows the transfer of a naturally occurring pest-resistance gene from one plant species into another species without this trait to make the recipient crop produce its own pest resistance characteristics. The ability for a crop to produce its own resistance has the benefit of reducing or eliminating application of chemical pesticides which may harm the environment.

Proponents of genetic modification (GM) argue that the use of these technologies will advance agricultural production and increase quality of life. Scientists and the biotechnology industry assumed that “sound science” would lead to consumer confidence in GM products (Krueger, 2001). However, GM food products have received mixed regulatory and public acceptance around the world (Bredahl, 1999; Gaskell, 2001; Hallman, 2002). The European Union imposed severe restrictions on the use of GM crops in any portion of its food chain. In the U.S., where GM crops entered the food system in the 1990s without evoking major public resistance, recent public opinion surveys have shown signs of increased anxiety about the safety of these crops (NSF
Indicators Survey, 2004). Recent declines in public support for the use of recombinant DNA technology in food production are evident in International Food Information Council surveys which found that public acceptance of GM food fell from 78 percent in 1997 to 59 percent in 1999 (Priest, 2000).

The public perceived the risks of GM technology to include: potential alterations in the nutritional quality of foods, possible antibiotic resistance, concerns for enhanced or created toxicity as a by-product of modification, potential allergenicity, unintentional gene transfer from GM varieties to traditional or wild varieties, the possible creation of mutant viruses, limited access to GM seeds due to patenting, threats to biodiversity, and social concerns, as well as the issue of the labeling of GM products (Uzogara, 2000).

The public’s perceived potential benefits to GM technology include: improved shelf-life of fruits and vegetables, enhanced nutritional quality and health benefits of food products, improved protein quality as a result of genetic modification, increased carbohydrate content via GM technology, improvements in quantity and quality of animal-based products, higher crop yields, production of edible vaccines and drugs, lesser environmental impact from crop production that requires a lesser amount of chemical inputs, an overall increase in agricultural productivity, and the ability of GM to remove industrial waste and improve toxic chemical recycling (Uzogara, 2000). The success of food biotechnology is thought to depend on consumer confidence in these benefits and demonstrated safety of genetically modified food products.
Previous studies found that consumer acceptance of GM food products could be positively influenced via a focus on benefits to consumers, but only abstract terms. Consumers perceiving benefits such as increased shelf life, better taste, and greater nutritional value were more likely to accept GM food products (Baker and Burnham, 2001). Researchers also noted that a general willingness to accept genetic modification of food was correlated positively with an increased understanding of biotechnology in general. As would be expected, individuals whose risk perception outweighed their benefit perception were less likely to accept GM foods. Yet, these correlations, while statistically significant, explain only 2-3% of the variance in acceptance of GM food (Bill Hallman, personal communication).

Approval of GM to create food appears to vary with the specific application of the technology. Frewer (1996) inferred that when applications of biotechnology are presented in general terms, they cause individuals to think about the issue in a single, mostly positive dimension. Thus, people tend to either accept or reject biotechnology as a whole. However, when individuals are presented with specific applications, particularly those that relay obvious tangible benefits or risks, the perception of GM technology is viewed accordingly dependent upon the valence (positive or negative frame) in which it is presented. A significantly more positive attitude was shown by consumers toward the genetic engineering of plants than the genetic engineering of animals or humans (Frewer, 1996). There have been a number of studies exploring attitudes toward GM in general and fewer to determine consumer acceptance issues
related to the technology. Previous research has examined consumers’ socio-economic, demographic, and belief characteristics relative to their level of acceptance of GM foods. Additionally, several studies have analyzed the relationship between consumer’s risk and benefit perceptions, attitudes on labeling, and trust in government and industry as potential factors in their decision to approve or disapprove of GM technology. Relatively few, however, of the available studies pertaining to consumer issues and genetic modification include comparisons between countries (Gillett, Nayga and Onyago, 2004).

According to Shamos (1995), most people in the United States are indifferent to science, accepting science as necessary for economic development, but unaware of the prevalence of science and technology in their daily lives. Recent surveys reinforce the contention that the public does not know much about science (NSF, Chapter 7, Science Indicators Survey 2004). The public is often unaware, for example, of the nature of scientific advances, or how science integrates into the very fabric of their quality of life, including the food they eat. Data from National Science Foundation shows conflicting and competing opinions about genetic modification. Seventy-five percent of Americans for example, believe “nature is so complex, that it is impossible to predict what will happen with GM crops.” At the same time, four in five Americans “approve of GM to create more nutritious grain and three in four would approve of GM foods to create less expensive or better tasting foods” (Hallman, 2004). The percentage of the American public with an “undecided” opinion about the moral acceptance of genetically modified
foods has grown since the first survey in 1998, suggesting that Americans are becoming more aware of the potential drawbacks and may be moving toward the undecided category, ever so slightly, while opposition to GM foods is already fully entrenched in many countries in Europe and Asia.

A review of the literature across cultures on the topic of acceptance of biotechnology illustrates diversity of opinion within cultural regions. Genetically engineered crops were introduced to the U.S. and other industrialized countries in the mid-1990s. In the United States, 76 million acres of farmland are sown with genetically altered seeds (Economist, March 2003), including up to 65% of all American corn and soybeans that are engineered to produce their own resistance to pests. In North America, these new crops were introduced with little public reaction. In Europe, the reaction was significantly less positive. The United States, Argentina, Canada and China account for 60 million hectares of GM crops.

The reaction from consumers has been mixed in Asian countries. Consumers in Japan have expressed anxiety about genetically modified (GM) food products and consumers are willing to pay a 10% premium for “non-GM” soybean products (Economist, 2003,). Japanese regulators have responded by instituting labeling requirements and by imposing testing protocols for imported corn. China is both an importer and producer of genetically modified food products, ranking 4th in world acreage of land sown with GM seed varieties. According to a survey by the Chinese University in Hong Kong, 45% of
Hong Kong consumers would be willing to pay more for “GM-free” products. South Korea has placed import restrictions on GM products while pursuing its own agricultural biotechnology development (Economist, 2003).

While Asia shares the same environmental and social concerns about genetic engineering as the broader global movement, it presents unique cultural differences concerning food, agricultural perceptions and practices. Food strongly sustains national, ethnic and social identities. What Asians eat and how food is prepared is significantly mediated through notions of time and space, order and transgression, nature and culture (Hindmarsh, 2003). For example Hindus regard all living creatures as sacred: the cow is seen as a complete ecology—as a symbol of abundance—food (milk), labor (plowing) and fuel (manure). A major critique of GM crops and adoption of agricultural biotechnology by developing economies in Asia, despite the benefits of reduced pesticide use and resistance to drought, is fear of “bio-colonization,” a term that implies forced technological dependence. The option presented by technology and science is driven by the Western value system, including economic progress and growth. Behind the technological artifact (GM food technology) is a whole framework of cultural assumptions concerning capital, power, ideology, knowledge and morality (Hindmarsh, 2003). Through technology transfer and globalization, this technological framework creates a “technological framework for daily life”. The article goes on to say that the scope of the adoption of this framework limits and focuses future social developments that are likely to follow, (i.e., other technological and cultural choices are constrained).
Economic, political and social conditions may also affect acceptance of GM foods. There are a number of arguments against biotechnology on the basis that it re-distributes costs and benefits. When proponents state that developing nations will be better able to feed their populations with more nutritious, vitamin-enhanced or disease-resistant crops, Prince Charles quoted in “GM food and Crops, what went wrong in the UK?” (House of Lords, 2000) countered, “Where people are starving, lack of food is rarely the underlying cause.” Rather [Prince Charles believes] poverty, poor food distribution, inefficient management systems and political problems drive much of the malnutrition in the world.

Macro trends operant in Asia include diminishing arable land concurrent with an increasing population. Livelihoods derived through agriculture in developing countries of Asia stand at an average of 46% compared to just 2.4% in U.S. Further, conventional (i.e., non-GM) plant improvement methods are reaching their limits. Public awareness and acceptance of GM in developing countries of Asia is varied. Sixty-one percent of the general public in Indonesia knows “they have eaten DNA” compared to only 24% of Chinese. Yet, China is second only to the United States in agri-biotech research (Powel, 4th International Seminar on Bio-safety, Seoul, South Korea, May, 2003). In general, scientific literacy in China is very low on national comparisons with less than 4% of the population considered scientifically literate (compares to 28% of the U.S. public). Yet in China, the population embraces GM crops while in Indonesia, there is wide-spread
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suspicion-15% of Indonesians answering they had taken steps to avoid eating GM products compared to only 3% of Chinese respondents. Southeast Asians show high interest and perceive low risks to biotechnology according to a survey by the University of Illinois, Urbana-Champaign in 2002. In Taiwan and Japan, both governments are promoting biotechnologies while their citizenries remain deeply suspicious of GM foods. Whether or not political, economic and social factors play a consistent role in the decisions and opinions of the public across national boundaries is not well researched, especially in the context of comparative surveys on public perceptions of GM foods.

In Europe, opinion polls show that the public’s negative attitudes have mellowed (except in Germany and the Netherlands) during the 1990s. Still, anti-biotechnology sentiments are much more common in Europe than in the United States. The number of people with negative opinions on food biotechnology has increased in just 3 years (1996-7 to 1999-2000) according to an international comparative survey by Gaskell, Allum and Stares (2003), and Miller et al. (1996). For example, the surveys show that Americans have the most favorable attitudes—46% of Europeans agreed that GM food was “useful” compared to 69% of Americans. Additionally, the survey data showed 60% of Americans thought GM food was morally acceptable compared to 40% of Europeans and 55% of Canadians.

A 2002 Gallup poll of 1200 housewives via the Internet in South Korea points to very high awareness, with nine in ten people surveyed citing they had heard about GM foods.
That survey further revealed negative opinions that accompanied that awareness, with 70% stating they had serious environmental and health concerns, and over half would not purchase these items if given a choice.

Several studies have shown that awareness of biotechnology is tied to higher levels of education. However, this pattern is not consistent between countries. For example, consumers with higher and lower levels of education in the United States held similar beliefs about acceptance of GM foods (i.e., were more likely to accept) whereas, consumers with higher education levels in Europe clearly tended to have higher acceptance levels (although still low) for GM foods. In Japan, interest in “new scientific discoveries and science and technology literacy is relatively low compared to interest and knowledge of economic and environmental issues.” Likewise, consumers in Japan hold distinctly negative views about food biotechnology, despite Japanese government approval of 43 GM products and continuing research funding in 1999. The Eurobarometer (2002) notes a mixture of support/no support opinions are dependent on factors such as education level, type of biotechnology application (red-medical, green-agricultural, and white-materials), moral acceptance and risk aversion. Further, data from the Eurobarometer show that it is too simplistic to attribute support for biotechnology on lack of scientific knowledge (i.e., the deficit model). Level of political engagement and trust in institutions is also a factor in European attitudes, with consumer advocacy groups and health professionals, less so scientists, striking feelings of trust from the public. The European public demonstrated remarkably low confidence in
government and industry. The TV media were more trusted than the print media and the
government or industry in many European countries similar to South Korea. These
patterns vary widely between the U.S. and most other countries, such that the American
public tends to be more trusting of government and business, less so of media. U.S. trust
in science is also quite strong. Priest (2002) found that trust-gaps (i.e., the difference in
points assigned to pairs of institutions across cultures) was predictive of encouragement
for applications of genetic engineering. This finding is significant progress in detecting
salient social value differences across cultures.

“Post-industrial” societies as termed by Beck (1992) are “risk societies”. That is, post-
industrial societies are organized around concerns for risk and management of risk. Risk
perception was in part the basis for the argument that probabilistic knowledge (or
mathematical risk assessment) drives decisions about what types of technologies or
science might be perceived as risky. However, actual public responses to “risky
technologies” challenge this presumption, and studies by Slovic et al. (1979) have
unambiguously established that individual perceptions of risk are not driven by
perceived probability of harm (Priest, 2002).

Culture and subculture, gender, and “worldview” or level of worldliness (Douglas and
Aaron, 1982; Sjoberg, 1998), have been assessed as possible causes that might impact
acceptance of risk, especially of new technology. Yet, none of these factors has been
consistently shown to be an explanatory factor for acceptance of GM foods across cultures.

Researchers who primarily rely on quantitative surveys to investigate the relationship between acceptance of GM food and culture (usually countries) are finding survey methods to be inadequate. Cross-cultural studies require a more descriptive and inductive methodology with which to understand the socio-cultural underpinnings of perceptions and acceptance of new technologies such as GM food. Results from this study presented in remaining chapters attempt to account for the influences of culture in the formation of attitudes and opinions about GM food. In the next chapter, the researcher will: 1. Illustrate in detail the broad field of public awareness and understanding of science, specifically related to GM foods; 2. Describe the relationship of science to culture; and, 3. Discuss various approaches to analyzing national culture.
CHAPTER II

REVIEW OF THE LITERATURE

To explain what factors influence acceptance or rejection of GM food technology, it is important to review how and why societies value and understand science. Milner (1986), in arguing for the promotion of public understanding of science, points to the intrinsic value of science. “Scientific knowledge is a cultural product of great beauty and as such is very rewarding in its ability to explain the natural world.” Thomas (1987) and Durant (1989) extend intrinsic boundaries to include instrumental rationales that connect knowledge of science with economic gain, improved decision making capacity, increased accountability in government, increased social acceptance and support for science and appreciation for science as the major achievement of our culture (emphasis added).

Scientists may assume that science is “culture-free.” Scientists may argue that ideally, objective information about risks and benefits of biotechnologies is available to the public for the taking. Scientists may be less likely to believe that the science itself is influenced by culture, or that perceptions of science (e.g., recombinant DNA technology) should therefore also not be influenced by culture. Many proponents of GM biotechnology assume individuals with negative opinions about GM foods have “irrational” fears of the technology to which they ascribe a lack of understanding. Additionally, the scientific community may feel the public makes its decision without
considering that 1) scientists are only engaging in a process of discovery, 2) scientists are impartial and do not make policy; and 3) rigorous safety and regulatory precautions are inherent in the scientific methods used to create GM food.

The mainstream scientific community acknowledges culture’s impact. In a report “Science for All Americans”, the American Association for the Advancement of Science (AAAS) reported that science is carried out in, and consequently influenced by its social context (AAAS, 1989). Arguably, individuals in different societies conceptualize and form opinions based on a diverse set of scientific, cultural, economic, political and religious beliefs and value systems. An American study reported in NSF Indicators, found that being more religious, skeptical of government’s ability to regulate safety, and distrust of large corporations correlated positively with increased negative opinions about GM foods. In the European Union, higher levels of scientific literacy about biotechnology are found in some studies to correlate with approval of biotechnology. However, other studies show scientific literacy’s effect is mediated by living in rural versus urban settings and level of involvement in politics (Eurobarometer).

Therefore demographic measures (including gender, age, income, education) are unreliable across cultures (Bruce Lewenstien, personal communication). Other mediating factors studied for their impact on acceptance of GM foods (e.g., political affiliation, risk perception, scientific literacy levels, etc.) are shown to be illustrative of acceptance of GM foods, but not consistently over time or across cultures. Thus,
comparing opinions on science, especially globally controversial technologies across cultural boundaries, deserves increased attention.

Definitions of the public, defined as every person in society, also prove confusing for research purposes when defining the public in “public understanding of science”. Burns (2003) identifies six overlapping stakeholder groups:

1. **Scientists**, in industry and academic settings, those directly engaged in science as a profession;
2. **Mediators**, such as teachers, journalists, educators, science museum professionals and parents who strive to inculcate scientific information to others;
3. **Decision makers**, seeking solutions to problems through science and technology such as researchers or policy makers in academic, industrial and governmental settings;
4. **Communities of interest**, publics which include both those interested in science and practitioners of science at the amateur level;
5. **Attentive publics**, which actively follow science or particular aspects of science non-professionally and who are well informed about scientific concepts;
6. **Interested publics** which passively follow science or particular aspects of science and who are not well informed about scientific concepts.

These sub-groups have traditionally been participants in research about the “public” in “public understanding of science”.
In defining ‘science’, the Panel on Public Affairs of the American Physical Society proposed a definition of pure science that encompasses the following elements: 1) The systematic gathering and organizing of information about the world; 2) Condensing knowledge/observation into testable hypotheses, theories and laws; and by which 3) The success and credibility of science is anchored in the willingness of those who engage in scientific processes to expose their ideas and results to independent testing and replication. Further, public understanding of science (PUS) is not an easily assessed condition, such as possessing a degree of scientific literacy. Rather, it may be described as developing comprehension about the meaning and implications of scientific concepts (Alsop, 1999). A distinction may also be drawn between ‘public awareness’ and ‘public understanding’ of science (PUS) which is evident across British and American cultures. Gilbert, Stocklmayer and Garnett (1999) define public ‘awareness’ as a set of positive attitudes evidenced by a series of skills and behavioral intentions. That is, attitudinal measures such as appreciation for science’s role in society and some attention to scientific endeavors as portrayed, typically in the press, are examples. These terms are not used interchangeably in research in different countries. In the United States PUS is often used to describe both awareness and elements of scientific “literacy” or measures of scientific culture, whereas in the United Kingdom and other parts of the world, the preference is to use scientific “awareness” when discussing public opinion. Other definitions place awareness as a pre-cursor to understanding (Burns, 2003), while the condition of “understanding” PUS applies only to non-scientists and, requires the ability to: 1) explicate the nature of scientific methods; 2) demonstrate awareness of current
scientific advances (House of Lords, 2000); 3) answer questions of scientific content (e.g. True or False: It is not possible to transfer a gene from a plant to an animal); 4) demonstrate the ability to repeat the linear scientific processes (e.g., observation, hypothesis formation, testing…etc.); and 5) recognize science as a social enterprise with societal impacts, (Millar, 1996).

Karin Knorr-Cetina in her book titled *Epistemic Cultures* (1999) asserts that the concept of culture is often divided into three forms: the state (national culture), the economy (market culture) or business firm (organizational culture). Cultures become identifiable when groups of people “orient themselves more toward one-another…than toward outside referential systems” (p.2). The practice and tenets of science in this sense, is also a cultural form. As such, science has its cultural mechanisms of knowing and believing [epistemic cultures]. Each aspect of science, Knorr-Cetina compares particle physics with molecular biology, is manifested through what each is attempting to understand. Physics seeks to know the components of the universe –transcending anthropocentric and culture-centric scales of space and time. Biology seeks to understand life—which is dependent on anthropocentric notions and which are critical to the success of molecular biology. Each has its unique methods, assumptions and systems of knowing. There is widespread consensus that we live in a knowledge society. “Knowledge has become a productive force replacing capital, labor and natural resources as the central value and wealth creating factor” (p. 6). Knowledge societies are characterized by pervasive technologies (especially information technology), expert
systems and professionalized science services. Individuals increasingly must interact with information produced by knowledge-intensive expert systems that are transnational social units such as corporations. From a sociological perspective then, knowledge societies have within them an increasing number of “black-boxed” expert systems (cultures) that produce information and technological products to society. Inherent in this process is the adoption of products of science, perhaps before they have been fully explored. This seems to be the case with GM foods and therein lays the conflict.

One of the more useful concepts in discussing the role of culture in forming opinions about science is the notion of Scientific Culture (SC). One definition of scientific culture is offered by Olugbemiro (1997) who describes a set of values, ethos, norms, and practices based on universalism, logical reasoning, organized skepticism and belief in the tentativeness of empirical results. Scientific culture thus is an expressed value system, a means by which all members of a society may access a system of knowledge for answering the great questions facing humanity (Godin and Gingras, 1996). The level of scientific culture may directly impact opinions about controversial science such as GM foods. The degree of scientific culture may vary across cultures due to different socio-economic circumstances, ideology and values.

Many societies have a high interest in and approval of science in the belief that science is an ever present and important factor in improving peoples’ lives. However, high interest and approval levels do not seem to lead to high levels of literacy and
understanding. The World Values Survey conducted by Ronald Inglehart at the University of Michigan found decreasing confidence in science and technology in developed countries and increasing confidence in developing countries. Inglehart finds these shifts to be consistent with the level of economic development, and that other cultural values are linked to this trend. For example, as gross national product (GNP) increases, value structures of societies move from worrying about survival and accretion of material wealth toward post-modern values— the active pursuit of individual interests and the importance of having choices. Rapid economic development and wealth accumulation has hastened expectations about having choices in South Korea, yet South Korea’s continued dependence for food imports (especially GM Soy) has created a conflict between expectation and societal identity and reality. U.S. society has progressed through a period of rapid agricultural development and industrialization toward the knowledge economy, while other countries are in different places along a scale of values represented by a range of questions covering the degree of importance people place on:

- Economic and Financial security (Hofstede’s Uncertainty Avoidance)
- Male predominance (Hofstede’s Masculinity)
- Satisfaction with one’s life
- Role of God in daily life
- Political activity (Hofstede’s Power Distance)
- Tolerance for diversity
Studies which take into account the context in which science is evaluated, such as the *World Values* Survey, cast doubt on the current model of looking at acceptance of science, referred to as the *deficit model* (Burns, 2003). The *deficit model* assumes there is an “educational gap” and stipulates that if the public understood more about science, risks, and the nature of the research process, then people would be more accepting of these technologies. Therefore, efforts in traditional PUS activities have focused on educating people about these three elements. The *deficit model* is now widely believed to be inadequate in explaining public perceptions even within one cultural context.

In addition to the deficit model, another framework for examining acceptance and approval of science has emerged (Lewenstein, AAAS, 2005). The *Contextual or Heuristic model* emphasizes the importance of the frame in which science is communicated and the context in which the message about science is received. The contextual model gives significant weight to the social-psychological processes that may influence interest or acceptance of a particular scientific or technological concept. The model strives to account for general attitudes toward science, perceptions of trust, risk, demographic characteristics and ideology. Thus, a person’s positive or negative perception of GM foods is heavily influenced by: 1) whether or not GM food is conceived of as a technology with an ascribed value; 2) whether past experience with a “similar” or perceived similar past artifact provides existing cognitive frames; and 3) whether, in the absence of more immediate frames, a person’s extant cultural interpretive devices such as levels of trust in institutions (governments, business, media, science),
and basic internal value or ideological structures (e.g., concepts of nature and spirituality) predominate as heuristics.

Edward Stewart (Gundykunst, 1985), states that rather than relying on evidence and logic as Westerners do (also referred to a logical realism), people in Eastern societies rely on form and emotions. Languages also reflect this tendency in appearance and grammar. Thus cultural perceptions of ultimate reality in the case of perceptions of GM food risk are purported to be derived from “experience” in the Western culture and from “form” (heuristics) in Eastern cultures. It is not clear whether this has any relevance for South Korea and American culture related to GM food acceptance.

A recent study measured “trust-gaps”, or differences in trust between each society’s institutional actors, across eighteen countries in Europe and America (Priest, Bonfadelli and Rusanen 2002). This study found significant correlations suggesting that differences across cultures (in this case the U.S. and countries in Europe) about biotechnologies are related to the varying levels of trust people in each society place in their respective private and public sector institutions, rather than any particular utilitarian cost-benefit assessment, level of scientific literacy or categorical demographic characteristics.

Culture today may be defined as a set of shared attitudes, values, beliefs and behaviors communicated across society and between generations (Matsumoto 1994). Culture has three characteristics: 1) it is not innate, but learned; 2) the various facets of culture are
interrelated; and 3) it is shared and in effect, defines social group boundaries (Hall, 1976). Hall describes culture as “man’s medium”–how one thinks, expresses emotion, acts and notably, how one solves problems. Thus, as society produces an environment that includes technological solutions to problems, cultural interpretations are bound to impact both the definition of the problem and the technological components of a solution.

Culture also refers to shared attributes (beliefs) that do not confine themselves to nationality, race, ethnicity or citizenship boundaries Matsumoto (1994) goes on to describe “Etic” truths (also termed ‘universal’ truths) as those that are defined as truths across cultures. Etic knowledge is theoretical, normative and derived from outside one’s culture. “Emic” truths, in contrast, derive their ‘truth-value’ within the boundaries of one culture. Thus Emic knowledge is learned within the culture and stands in complement to Etic understanding. One with emic (insider) understanding is aware but not consciously aware of the trappings of his or her own cultural frameworks. It could be speculated that science comes closest to an “etic” truth that might be ascribed to by many different cultures. Each culture, including scientific cultures, develops a distinct way of interpreting and managing information (inputs), including scientific information. Because one exists within his own cultural context when interpreting inputs (including scientific information), one should assume that there are considerable influences on the information, not only from the conveyor, but also by the consumer of information and that ethnocentricity, personal or societal biases; in effect, emic (within-culture) belief
systems are active influencers on decisions about technology. Further, the languages, both written and spoken, represent a cultural extension that also defines a boundary and context for interpretation of scientific artifacts, including food.

Culture and more specifically, cultural differences, have been analyzed by Geert Hofstede, who conducted a series of studies of how cultural values are expressed (see Culture’s Consequences (1980), and Cultures and Organizations (1991). Hofstede proposed five (5) dimensions for examining issues across cultures:

1. **Power Distance Index (PDI)** focuses on the degree of equality, or inequality, between people in the society. A **High Power Distance** ranking indicates that inequalities of power and wealth have been allowed to grow within the society. These societies are more likely to follow a caste system that does not allow significant upward mobility of its citizens. A **Low Power Distance** ranking indicates the society de-emphasizes the differences between citizens' power and wealth. In these societies equality and opportunity for everyone is stressed.

2. **Individualism (IDV)** focuses on the degree to which the society reinforces an individual or collective focus, recognizes achievement and places value on interpersonal relationships. A **High Individualism** ranking indicates that individuality and individual rights are paramount within the society. Individuals in these societies may tend to form a larger number of looser relationships. A **Low Individualism** ranking typifies societies of a more collectivist nature with close ties between individuals in groups. These cultures reinforce extended
families and collectives where everyone takes responsibility for fellow members of their group.

3. **Masculinity (MAS)** focuses on the degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control, and power. A **High Masculinity** ranking indicates the country experiences a high degree of gender differentiation. In these cultures, males dominate a significant portion of the society and power structure, with females being controlled by male domination. A **Low Masculinity** ranking indicates the country has a low level of differentiation and discrimination between genders. In these cultures, females are treated equally to males in all aspects of the society.

4. **Uncertainty Avoidance Index (UAI)** focuses on the level of tolerance for uncertainty and ambiguity within the society, i.e., unstructured situations. A **High Uncertainty Avoidance** ranking indicates the culture has a low tolerance for uncertainty and ambiguity. This creates a protection-oriented society that institutes societal (both social and legalistic) controls in order to reduce the amount of uncertainty. A **Low Uncertainty Avoidance** ranking indicates the culture has less concern about ambiguity and uncertainty and has more tolerance for a variety of options, risks and lack of structure. This is reflected in a society that is less rule-oriented, more readily accepts change, and accepts greater risks.

5. **Long-Term Orientation (LTO)** focuses on the degree to which the society embraces the long-term view of societal issues. A **High Long-Term Orientation** ranking indicates a culture that adheres to the values of long-term
commitments and respect for traditions. This is thought to support a strong work ethic where long-term rewards are expected as a result of today's hard work. A **Low Long-Term Orientation** ranking indicates the culture does not reinforce the concept of a long-term, traditional orientation. In this culture, change can occur more rapidly as long-term traditions and commitments do not become impediments to change.

An analysis by Hofstede of countries including South Korea and the United States illustrates the differences between each culture. Again, these dimensions are defined as:

- **Power Distance Index (PDI)** - the degree of equality between people in a society.
- **Individualism (IDV)** - the degree of individual orientations in a society.
- **Masculinity (MAS)** - the degree of male-dominated positions in a society.
- **Uncertainty avoidance Index (UAI)** - level of tolerance for uncertainty in society.
- **Long-term Orientation (LTO)** - the degree to which people embrace (cling to) traditional values as these values relate to change over time in a society.

World average values for these dimensions are: PDI=55 IDV=40 MAS=48 UAI=62 LTO=43. In the case of South Korea, Hofstede’s analysis shows South Korea's Index values are: PDI=60 IDV=18 MAS=39 UAI=85 LTO=72. In the case of the United States, Hofstede’s analysis shows American Index values are: PDI=40 IDV=91 MAS=62 UAI=46 LTO=29 A comparison of the United States, South Korea and world averages is shown below in Figure 1.
South Korea's highest Hofstede Dimension is Uncertainty Avoidance (UAI) at 85, indicating the society’s low level of tolerance for uncertainty. Hofstede claims that Korean society will attempt to minimize or reduce this level of uncertainty through strict rules, laws, policies, and regulations. The ultimate goal of this population is to control in order to avoid the unexpected. As a result of this high Uncertainty Avoidance characteristic, the society does not readily accept change and is very risk averse. Second, South Korea has a low Individualism (IDV) rank of 18. The score on this Dimension indicates the society is Collectivist as compared to Individualist. This is manifested in South Korean’s close, long-term relationships and commitments to 'groups'- be they family or work or communities of interest. Loyalty in a collectivist culture is
paramount, and over-rides most other societal rules and regulations. The society fosters strong relationships where everyone takes responsibility for fellow members of their group.

There are only seven (7) countries in the Geert Hofstede research that have Individualism (IDV) as their highest Dimension: USA (91), Australia (90), United Kingdom (89), Netherlands and Canada (80), and Italy (76). The high Individualism (IDV) ranking for the United States indicates a society with a more individualistic attitude and relatively loose bonds with others. The next highest Hofstede Dimension is Masculinity (MAS) with a ranking of 62, compared with a world average of 50. This indicates the USA experiences a higher degree of gender role differentiation. The male dominates a significant portion of the society and power structures. The United States displays the lowest long-term orientation (LTO) dimension at 29, compared to the world average of 45. This low LTO ranking is indicative of Americans’ belief in meeting its short-term obligations, but tending not to reflect an appreciation for long-term or deep cultural tradition. The next lowest ranking Dimension for the United States is Power Distance (PDI) at 40, compared to the world average of 55. This is indicative of a sense of greater equality between societal levels, including government, organizations, and even within families. The last Geert Hofstede Dimension calculated for the USA is Uncertainty Avoidance (UA), with a ranking of 46, compared to the world average of 64. A low ranking in the Uncertainty Avoidance Dimension is indicative of a society that does not attempt to control social outcomes. A low ranking also indicates a greater
level of tolerance for risk and more easily accepts a variety of ideas, thoughts, and beliefs into the social fabric.

In all Hofstede’s categories, the United States and South Korea fall into opposite thirds, suggesting strong differences across the scales. Thus, if culture impacts differences in opinion about GM foods, it may likely be discovered between South Korea and the United States.

Although beyond the scope of this study, Hofstede described another factor, Confucian Dynamism, which determines the time orientation of a culture, either long-term or short-term. Hall (1976) describes culture in terms of high and low context—that is, a continuum whereby messages are understood implicitly, with fewer explicit details—a characteristic of high context culture, or explicitly, characterized by low context, entailing a higher need for directness. Hall also describes polychronic or monochronic cultures. Time orientation is linear and sequential in monochronic cultures (e.g., northern Europe or the United States) whereas in polychromic cultures, processes and tasks are flexible and time may adapt to the needs for multiple and competing relationships and situations with changing priorities (e.g., Latin America, South Pacific, etc.). More recently, Trompenaars and Hampden-Turner (1998) described the forces that dominate the dynamics of relationships between people—namely an emphasis on egalitarian adherence to laws or rules that apply universally, or in contrast, an emphasis on factors such as social rank, or place in the societal hierarchy or depth and strength of familial or
personal relationships. Examining each dimension in detail related to US and South Korean culture we see in Table 1 below a variety of cultural factors. [Note: Parenthetical scores reflect comparative rankings on each factor].

Table 1: Comparative Rankings, USA South Korea and the World.

<table>
<thead>
<tr>
<th>Factor</th>
<th>USA</th>
<th>South Korea</th>
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<tr>
<td>Factor: Does one believe that the individual is most responsible to themselves and immediate family? Does one behave in the interests of the group? Are loyalties given to the self and the smaller group (individualist) or the larger group (collectivist)? (Hofstede range of scores was 1-53)</td>
<td>Individual: 1/53</td>
<td>Collective: 27/53</td>
</tr>
<tr>
<td>Factor: Does a society accept an unequal distribution of power? How empowered to people in a society feel? High P/D cultures tend to accept orders from superiors without question whereas Low P/D cultures tend to question authority.</td>
<td>Low Power Distance: 38/53</td>
<td>High Power Distance: 27/53</td>
</tr>
<tr>
<td>Factor: Does a highly certain outcome more or less desirable? How well is risk or ambiguity tolerated? How comfortable are people in novel or ambiguous situations?</td>
<td>Uncertainty Tolerant: 43/53</td>
<td>Uncertainty Averse: 16/53</td>
</tr>
<tr>
<td>Factor: Is societal behavior more assertive and decisive (i.e., considered masculine) or modest, nurturing and demure (i.e., considered feminine)?</td>
<td>More Masculine: 15/53</td>
<td>Less Masculine: 41/53</td>
</tr>
<tr>
<td>Factor: How important are the past and future verses the present? Polychronic cultures place more importance on both the past and future than do monochronic (Hofstede and Bond)</td>
<td>Monochronic</td>
<td>Polychronic</td>
</tr>
<tr>
<td>Factor: How important or necessary is detailed, explicit communication in relating information between people? Confucian Dynamism-states that especially in Asian cultures, communication seems vague and non-explicit when compared to western communication with its penchant for direct unambiguous statements.</td>
<td>Low Context</td>
<td>High Context</td>
</tr>
<tr>
<td>Factor: Do relationships prevail over rules? A universalist would not break the rules for a friend. A particularist would consider the relationship more important than the rules, or the rules of science in this case (Trompenaars and Hampden-Turner).</td>
<td></td>
<td></td>
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</table>
Table 1: (Continued)

<table>
<thead>
<tr>
<th>Universalism: 27/31</th>
<th>Particularism: 3/31</th>
</tr>
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**FACTOR:** Does one consider oneself to have a “private or public space” - or sphere of responsibility- that is small (e.g., immediate family, oneself) or large (e.g., extended family, neighborhood, workplace or community of interest)?

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<tr>
<th>Specificity: 37/45</th>
<th>Diffuseness: 10/45</th>
</tr>
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</table>

**FACTOR:** How confident does one feel in the trustworthiness of society’s institutional actors (e.g., government, industry, media, NGOs, scientific community, doctors, farm groups, etc.) (Priest, et al.)

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<tr>
<th>Trusting of Institutions</th>
<th>Less Trusting of Institutions</th>
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**CULTURAL SYNDROMES** (Triandis)

*Tightness:* Cultural homogeneity – The relative frequency and degree of shared norms for social interaction; e.g., even minor deviations of from established norms are criticized (noticed) in tight societies. South Korea would be considered “tight” compared to US.

*Complexity:* Cultural heterogeneity – The diversity of cultural elements, such as co-existence of sub-groups, which can be large or small; e.g., contrast small rural farming communities with large urban metropolises (religions, ethnicities, political and economic diversity, etc.). The United States would be considered diverse compared to South Korea.

*Active-Passive:* Societies which demonstrate more or less active competitiveness, proactive, self fulfilled; contrasted with passive, reactionary and relationship dependent. US is active compared to South Korea.

*Honor:* “Saving face” includes the importance of behaviors that either honor or dishonor other people. Korea places a great deal of emphasis upon saving face.

Other cultural factors may include:

- History of the national relationship (socio-economic/political)
- Dependence and Independence between the two cultures
- Cultural Affinity, or the relative degree of similarity between cultures
- Cultural Dynamism - the process by which a culture persists and changes
One finding not addressed by survey research is “Culture as a process of signification” – or the constant production and re-production of meaning in an individual’s behavior and in a particular context-the sum of which within particular (national) boundaries creates national culture. Do these different cultural dimensions capture anything useful in explaining acceptance (or rejection) of GM foods? It should be recognized that individuals and their socio-cultural value systems interact in complex ways. Understanding these interactions requires tracing factors back to both the societal and cultural levels. Further, distinguishing the “cultural” from the personal is a difficult but important task in understanding what drives national cultural differences and similarities in perceptions of the GM food phenomenon.
CHAPTER III
PROBLEMS AND METHODS

The purpose of this study is to compare South Korea and the United States on the topic of acceptance of GM food and to ascribe cultural explanations for acceptance of GM food among and between the two cultures. The research investigated the following questions:

1. How do South Koreans and Americans perceive GM foods?
2. What role does culture play in forming opinions about GM foods?
3. Is it possible to identify cultural factors that impact perceptions of GM foods?

For this study, culture is defined as national culture: a set of attitudes, values, beliefs and behaviors that may be understood among members within the culture. Further, culture may not be obvious or conscious, but rather it may be assumed and left unexplained by those within the culture until obviated by different cultural tenets that challenge one’s own cultural assumptions. Thus for this study, cultural explanations must be discovered through exposure to another cultural view and analyzed comparatively.

Meaning is actuated through culture. Culture is a predisposition (tendency) to respond in a given way when presented a set of information, circumstances or conditions. Research strategies for assessing opinion about science and technology should, therefore, be constructed in such a way as to fully account for social and cultural experiences.
Ethnocentric approaches to assessing public understanding of food biotechnology are inadequate when people are from different national cultures. In order to illuminate differences and similarities found in different cultures and national settings, research on methods should be more inclusive and open to discover the cultural filters that shape data on perceptions of GM food technology, and the value systems that impact the formation and expression of opinions generally about science and technology.

Guba and Lincoln (1989) describe conventional (positivist) and constructivist belief systems. The conventional belief system is characterized by a realist’s ontology: Reality exists independently of the observer and operates under a set of natural laws. Further, conventional belief systems assert an objective (subject-object) non-value attribution to the epistemology, or way of knowing the truth. Third, conventional belief systems use an “interventionist” methodology that purports to strip context from the object of study.

In contrast, a constructivist belief system asserts the existence of multiple, socially constructed realities (inclusive of culture). In this model, truth is defined as “the best informed and most sophisticated construction on which there is consensus” (Guba and Lincoln, p. 84). A second epistemological difference, departing from conventional belief systems, assumes that the researcher and topic being researched are interconnected in such a way that the findings from the inquiry are a creation of the process.
Constructivist methods, or hermeneutics, involve a continuing “dialectic of iteration,” re-analyses, and consensus-reaching process between the investigator and the investigated.

The implication of using different methodologies applied in the context of comparative cultural research, and interpreting results derived from cross-cultural understanding of science and technology, is considerable. Does employment of one belief system over the other bias the research results? Are comparative studies really asking comparable questions? How valid are the results from comparative surveys measured across cultures? In the field of public perceptions of GM food, do comparative surveys reveal how people are reacting to the scientific issue, and what would be reasonable conclusions to draw where information is based on science, but when opinion, and the research methodologies used are dependent on the trappings of culture? How do social and cultural factors influence the results (Burns, 2003).

The first step was to analyze results from a comparative study of Public Perceptions of GM food. Results from two separate, but otherwise identical surveys were used to examine question 1 described by Stake (1995) and Gall, Borg & Gall (1996, p. 374-5). The researcher examined item-by-item frequency distribution data from each of the standardized survey instruments administered in South Korea by the Korea Research Institute for Bioscience and Biotechnology (JANG, Ho Min, PI), and in the United States by Rutgers’ Food Policy Institute (William Hallman, PI). The researcher examined similarities and differences through a side-by-side comparison of responses
from the South Korean and American surveys. The comparison yielded similarities and
differences between the two cultures. Differences found in the data on acceptance,
scientific literacy, knowledge of food production, sources of information about GM
food, trust in institutions and a number of other factors were used as examples to
illustrate the contrasts between Americans and South Koreans that might potentially
have cultural dimensions. A summary of the comparative frequency data is provided in
Chapter IV.

Qualitative interviewing techniques served as a second step to explore culture and
acceptance of GM food. Interviewing techniques were used to describe culture generally
and to illustrate different opinions about GM foods to explore the role and impact of
culture in opinions. Interviewing strategies were used as described in Strategies of
Qualitative Inquiry (Denzin and Lincoln, 2003), specifically grounded theory (Strauss,
1967), as discussed by Cathy Charmaz in Chapter 32 (p. 677 in Gubrium, 2001) and as
described in Stake (p. 49-70), Borg, Gall & Borg (1996) p. 305-322 and cross-cultural
interviewing methods as described in Chapter 17 by Ann Ryen (Gubrium and Holstein,
2001).

Maximum variation sampling combined with snowball sampling as described in Lindlof
1995 (pp. 126-7) were used to recruit participants for the interviews. The researcher used
a combination of methods to elicit thoughtful responses including both individual and
paired interviews. “Scientists” and “Interested Publics” (as defined by Burns, 2003) were
the target groups for the interviews and included graduate students, faculty, and visiting scholars in science and the humanities, homemakers (with responsibility for food purchasing decisions) and clergy, or church “elders” representing Christian churches in the community. The final sample consisted of seventeen (17) interviewees who had the following characteristics: ten (10) South Korean; nine (9) males; ten (10) engaged in science; four (4) in humanities fields relevant to the topic; three (3) non-academics. American and South Korean participants were chosen based on their affiliation with or proximity to Texas A&M University. Diversity was sought in the range of characteristics within groups (e.g., gender, age, scientific awareness, marital status and presence of children). Subsequent participants were recruited after each interview was analyzed based on emerging themes, and in consideration of matching South Korean and American participants on demographic characteristics. Six participants were sent follow-up questions to pursue additional information about specific ideas that emerged from other interviews. South Koreans were interviewed either in the Korean language or in English. The language of the interview was determined according to each participant’s preference. Korean language interpretation was provided by a Korean graduate student matriculating for her masters in science journalism on a paid basis. To be included in the study, a participant must have been a national (citizen) from South Korea or the U.S., have had an interest or expertise in the issue of GM foods, and been willing to be interviewed more than once.
The interview protocol was approved by the Institutional Review Board (IRB) at Texas A&M University. The researcher described the purposes and expected use of the findings from the study during the recruitment process and again preceding the interview. An informed consent form was sent to each respondent in advance, reviewed before the start of the interview, signed and collected from each person. A short “pre-interview survey” was administered to all participants to include self-rated scales on degree of acceptance of GM food, scientific literacy and a word association exercise about his or her concept of “Nature”. The short survey also included contact and demographic information. All information was kept in secure electronic and paper formats. A question guide was developed for each interview and shared in advance with participants when possible. The question guide changed according to the type of participant and interview sub-topic, and the research assistant was consulted on question wording and format for Korean-language interviews.

The interviews ranged from thirty-five minutes to one and a half hours in duration. The interviews were audio recorded and transcribed with the written permission of each participant. All Korean language interviews were transcribed into Korean, checked for accuracy by the interviewer and subsequently translated into English. English translation questions were clarified through discussion between the research assistant and researcher. The researcher and the assistant discussed the English version of each Korean language interview before and following analysis. A post-interview assessment was conducted for Korean language interviews where the researcher was not in
attendance to ascertain the quality of the interview and potential interviewer effects or bias in the data collected. Participants were offered $20 cash for participation, of which ten (10) accepted.

The researcher utilized Grounded Theory to develop mid-range theoretical precepts. Grounded Theory was used in this research due to the need to reconcile the broad range of possible factors presented by current literature and survey research on factors impacting acceptance of GM food, and the yet-unexplored theoretical framework provided by Hofstede. Current early to mid-range theories on GM food acceptance include trust, deficit, contextual, and heuristics. However, due to this study’s focus on cultural factors, the researcher used grounded theory in order to be inclusive of current theoretical models of GM food acceptance and to integrate broad descriptive analyses of new cultural factors. Grounded Theory (see Charmaz, Ch. 32 in Gubrium, 2001) methodology is characterized by the following (p. 677):

- Simultaneous data collection and analysis
- Pursuit of emergent themes through continuous data analysis
- Discovery of basic social processes influencing the data
- Construction of abstract categories induced from the data
- Sampling to refine the categories through comparative processes, and
- Integration of categories into a theoretical framework that specifies causes, conditions, and consequences of the process.
In the interview protocol (see protocols in appendix), the researcher used illustrations of differences found in survey data between Americans and South Koreans and asked approximately ten (10) open-ended questions designed to elicit thoughtful discussion. A reflexive process ensued, whereby the respondents were encouraged to develop ideas together with the researcher that led to new ideas (e.g., “Have you eaten GM food?”). Interview participants were free to discuss each topic and the researcher attempted to reduce formality through “interview-as-play” (see Lindlof pp. 175-6) and minimize potential power differentials to the extent possible through informal attire, relaxed but private interview settings, and by asking interviewees to identify friends or colleagues to be interviewed in pairs. In conducting interviews across culture, the researcher: 1) Established and maintained rapport by establishing a collegial relationship; 2) Minimized insider-outsider problems of acceptance through the use of a South Korean interviewer; and 3) Reduced mistrust by fully disclosing the academic purpose of the interview, i.e., clarifying that the purpose was not to judge the participant or the participant’s culture and giving assurances to interviewees that there was no corporate support or purpose for this research. The researcher and assistant met frequently and practiced interviews together, being aware of non-verbal communication, interviewing using successful Korean communication methods (e.g., limited hand gestures, non-antagonistic language) and by developing documents in Korean language according to styles appropriate to South Korean culture. At the conclusion of each interview, participants were asked to be available for follow-up and the point was made that they were the “experts”, and that there were “no wrong answers.”
The researcher complied with all data confidentiality requirements and received approval from Texas A&M University’s Institutional Review Board. Data were stored on a local hard drive with restricted access and paper copies were kept in locked storage. All interview participants were given informed consent according to guidelines for human-subjects protection in accordance with Institutional Review Board procedures at Texas A&M University.

The researcher made the following assumptions regarding data analysis:

1. Multiple realities exist, especially in cross-cultural research;
2. Data reflect mutual constructions of the researcher and all involved in the study, but also contain mutual misperceptions that may preclude full understanding due to language or cultural differences;
3. The researcher enters, affects, interacts with and changes the participants and thus it became part of the methodology to identify interactive affects and bias.

Post-interview analyses were conducted by listening to the English language tapes in their entirety. The researcher took notes on the relevant themes, categories, ideas or concepts that were derived from the data. The post-interview analyses also examined the interview dynamics including rapport, question effectiveness, degree of honesty, interviewer biases, leading questions and comfort level of participants. Second, transcripts were examined for completeness and corrected in the text. The transcripts were sent to each participant for corrections, additions and editing before being read a
second time by the researcher for initial coding, noting details about the text that illuminate what is happening in the interview related to the topic. Initial codes were entered into the sidebar text. A third reading analyzed the text for selective coding: identifying abstractions or concepts that seem to have importance. Memo writing took place at various times over the course of the interviews to help the researcher stop and think about the data, spark ideas for further inquiry to discover and address gaps in previously collected data and make comparisons with other interview data. Interviews continued until the point of saturation, where few new ideas proved illustrative of the concepts developed in the study.
CHAPTER IV
FINDINGS AND ANALYSIS

The purpose of this study was to compare South Korea and the United States on the topic of acceptance of GM food and to ascribe cultural explanations for acceptance of GM food among and between the two cultures. This research investigated the following questions:

1. How do South Koreans and Americans perceive GM foods?
2. What role does culture play in forming opinions about GM foods?
3. Is it possible to identify cultural factors that impact perceptions of GM foods?

This research sought to illustrate cultural factors impacting the acceptance or rejection of GM foods. The researcher’s primary challenge therefore was reducing unacknowledged bias and misperceptions created by collecting data from another culture. The researcher enlisted support from a research assistant from South Korea as a primary strategy to understand cultural biases and to interpret data provided by subjects accurately.

Additional strategies to improve the quality of data include:

- Conducting interviews in Korean language
- Conducting post-interview assessments of interview dynamics
- Discussing interpretations of findings with the research assistant
- Pairing Korean and American interview participants
- Sending follow up questions to participants.
The research assistant, Ms. Sung Hee HAN became a crucial contributor not only in function, but also in form, as her experience was a reflection of the iterative process of significant events that occurred in interpreting opinions on GM food acceptance. Specifically, my early discussions with Sung Hee and hearing her perspective helped set the stage for effective qualitative analyses using grounded theory methodology described in more detail below.

Sung Hee acquired her Masters degree in science communication, yet started with little knowledge of the issue of GM food acceptance. By the conclusion of the study, Sung Hee accepts GM foods in a scientific framework; but, ultimately rejects GM food in deference to an overriding sense of concern for future generations. Sung Hee’s case demonstrates the appropriateness of a heuristic, contextual approach wherein her overall opinion contained elements of cultural factors namely:

- South Korean culture, she placed high priority on avoiding potential harm to future generations;
- The culture of her generation in South Korea, she embraced modern technology and attached conveniences and “the promise of science”, (i.e., reflections of South Korea’s generational shift toward cosmopolitanism);
- Scientific culture, she placed high value on objectivity and evidenced-based decision making;
- Market culture, she placed a premium on availability of desired food products at a reasonable cost;
• Political culture, she wished for Korea’s self-reliance in terms of agricultural imports and trade;

• Food culture, she prefers natural food grown from Korean soil; and

• American culture, she has an awareness of her individuality and has a respect for the privacy of others to decide for themselves about GM foods.

Different cultures sometimes coalesce and at other times compete for legitimacy depending on the context and specificity in which the decision (to accept or reject GM food) must be made.

A second significant challenge was in building trust, especially when participants learned there was an option to receive a $20 participant stipend. The researcher had to provide multiple reassurances that the research 1. did not involve corporate sponsorship and 2. results would not be used to represent South Korea in a pejorative way. I reiterated that the research was purely for the purposes of completing a dissertation. Sung Hee as a cultural and language interpreter was an important factor in developing trust, gaining access and establishing rapport with Koreans in the study.

I influenced participants in two ways that I can identify. Several Korean participants pointed out that GM food was not natural or created by God. When I pointed out that God created humans as well, I noticed that some participants re-considered whether GM technology was morally acceptable according to creation by God. I have no idea if this changed their minds about accepting GM food or if connecting humans more closely to
God mediated their thinking in any way. Second, I feel that Koreans I interviewed felt honored that the study focused on Korean culture and by my general interest in Korea. I did not set out to give the Korean culture “face” or honor it in my selection, but I felt that was nonetheless an effect on Korean participants. As for influencing American participants, perhaps an affect I may have had was in emphasizing the importance of other cultures and helping Americans see their own culture in more relative terms. For scientists in both cultures, I believe I was able to present culture as a valid and worthy pursuit of study, as more than a loose concept.

One of the most significant transformations for me as a researcher was trying to break away from my strong desire to “reduce culture into manageable pieces” in both a methodological sense and for analysis. In the conceptualization phases of this study, I remember causing great frustration among the scientists I asked and who tried to consider how “culture” might be made operational as a factor in acceptance of science and technological phenomena. Perhaps it was much easier for scientists to ignore the idea of culture as immeasurable and therefore unimportant in terms of study than to account for its influence. I incited equal frustration among the philosophers and anthropologists I spoke with when asking their assistance in making the concept of culture amenable to measurement and testing. These queries elicited responses such as “good luck”, from one scientist and “you’re not speaking my language” from the anthropologist.
I was also very surprised at the large amount of data that derive from so few interviews and that the data really do inform the research. Every time I looked at the data and spoke to someone about what I found, I was impressed with the corollaries and support that cut across interviews and insight gained from each individual interview.

Finally, I learned humility. Humility was gained through deep exposure to another cultural perspective. It is indeed humbling to have so many people think of me as so uninformed. But it was not just being outnumbered, it was the realization that science and logic can be very effective ways of understanding truth, but fall far short in explaining what is important about the truth to different people. I recall many instances of having to tell myself to “allow that idea through my filter of preconceptions and bias.” In analysis, I had to account for everything, not only for those ideas that supported my hoped for conclusions, but also those that did not.

The researcher had to make some decisions regarding gaining access to and understanding South Korean culture. Financial limitations and lack of language ability were the primary obstacles preventing interviewing participants living in South Korea. However, a lack of access to Koreans in Korea did not lead to inaccurate conclusions about Korean culture’s effects on acceptance of GM food. Cultural differences can only be obviated in the context of or in reference to another (different) culture. Therefore acculturation is a desired condition as opposed to something that needed to be controlled or avoided. Therefore recruitment focused on using participants from South Korea
living in America, specifically in the Texas A&M community. With the exception of one interview which took place in South Korea with a scientist trained at Texas A&M, participants were South Koreans associated with and living in the Texas A&M University community and acculturated to American (and perhaps Texas) ways of thinking.

The study was weakest in its illustration of American culture as a contrast to South Korean culture, due to the researcher’s inability to locate many Americans with extensive experience in South Korean culture and with knowledge of the subject. The limitation, therefore implied by this weakness, is that American cultural attitudes may be less well contrasted with their Korean counterparts.

A third limitation focuses on the amount of reflectivity about cultural difference on the part of each person interviewed. Reflectivity (depth of thought) was constrained by the time limitations (60 minutes) of the interviews. Although researcher follow-up questions probably served to spur further reflection on GM food acceptance, extended conversations and repeat interviews may have yielded additional useful data. The research assistant’s extended involvement helped to increase reflectivity of the study overall.

The benefits of working with a research assistant were numerous and far outweighed any limitations. Only with assistance was I able to gain quick acceptance with the target
population, reflect on the data through discussion, and derive assurance in the validity of the data collected by interviewing in the participants’ native languages.

Nonetheless, it is likely that some data were lost in the translation or in the interpretation stages. The extent to which data was lost is difficult to estimate. Originally, the goal was to avoid cultural bias. However, what I learned from this exercise was that a better goal was to capture data within both cultural frameworks and then make contrasts and comparisons.

There were inefficiencies in sharing responsibility for the study. At times I felt a loss of control of the study. For example, Sung Hee suggested some questions that I felt were not as exact or direct as questions I had envisioned in the area of food culture. Yet, these were to be delivered in Korean language, thus I suspect this was a culturally adapted approach that I should accept. So I did not try to change these questions and the resulting discussion was very fruitful. Also, Sung Hee and a friend of hers helped me to pilot the first interview to assess accuracy of questions in eliciting responses. With this information, I was able to rewrite questions in English that provided more detailed answers, for example the simplest question, “Have you ever eaten GM food?” proved to be a very good entrée to detailed references about cultural acceptance, while not focusing on culture in isolation from action.
Other times I felt there was insufficient time to communicate effectively with Sung Hee in carrying out the research itself. Human relations are central guideposts in South Korean culture, emotional and human connections are often secondary or tertiary to productivity-oriented American culture both in research and in daily living. The miscommunication between co-investigators thus may be attributed to cultural differences operational in the conduct of the research due to the salience of personal relationships in Korean culture in contrast to productivity values expressed in American culture. Additional time to communicate and discuss the issues may have added to the depth of the study’s findings.

As noted in Chapter III, there were seventeen interview participants. Pre-interview data was collected for each participant and included nationality, gender, GM food acceptance, scientific literacy and open-ended questions about the concept of “nature” see Table 2 below.
To explore some basic correlations among the participants in the study, the researcher calculated a series of cross tabulations comparing GM acceptance and nationality, gender, scientific literacy and the inclusion of humans in self-reported descriptions of “nature” (see Table 2 above). Nationality was strongly associated with acceptance as Americans accepted GM food with an average score of 5.7 (of max 6) with only one outlier case compared to Koreans’ average score of 3.1 with broader variation from the mean. Gender did not seem to correlate to acceptance and females were only slightly less accepting of GM food. Scientific literacy showed strong associations with acceptance, even in this knowledgeable but limited sample of 17 participants. Each

Table 2: Interview Participant Characteristics.

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Gender</th>
<th>Acceptance level (1-low 6-high)</th>
<th>Scientific Literacy level (1-low 3-high)</th>
<th>Inclusion of “humans” in associations with “Nature”</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMERICAN</td>
<td>MALE</td>
<td>6</td>
<td>3</td>
<td>Yes</td>
</tr>
<tr>
<td>AMERICAN</td>
<td>MALE</td>
<td>6</td>
<td>3</td>
<td>Yes</td>
</tr>
<tr>
<td>AMERICAN</td>
<td>MALE</td>
<td>6</td>
<td>3</td>
<td>Yes</td>
</tr>
<tr>
<td>AMERICAN</td>
<td>MALE</td>
<td>6</td>
<td>3</td>
<td>Yes</td>
</tr>
<tr>
<td>AMERICAN</td>
<td>MALE</td>
<td>5</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>AMERICAN</td>
<td>FEMALE</td>
<td>5</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>AMERICAN</td>
<td>FEMALE</td>
<td>6</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>MALE</td>
<td>6</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>FEMALE</td>
<td>5</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>FEMALE</td>
<td>4</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>MALE</td>
<td>3</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>MALE</td>
<td>2</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>FEMALE</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>KOREAN</td>
<td>FEMALE</td>
<td>0</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>MALE</td>
<td>0</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>MALE</td>
<td>3</td>
<td>3</td>
<td>No</td>
</tr>
<tr>
<td>KOREAN</td>
<td>MALE</td>
<td>6</td>
<td>3</td>
<td>Yes</td>
</tr>
</tbody>
</table>
participant was asked to give open-ended responses as to what came to their minds when thinking about “nature.” A moderate difference was found in acceptance depending on a participant’s inclusion or exclusion of “humans, man or human beings” in their open-ended descriptions of nature (see Table 3 below).

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>X²</th>
<th>df</th>
<th>Assym. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KOR/AMER</td>
<td>8.33</td>
<td>2</td>
<td>.016</td>
</tr>
<tr>
<td>MALE/FEMALE</td>
<td>.507</td>
<td>2</td>
<td>.776</td>
</tr>
<tr>
<td>SCI LIT</td>
<td>9.317</td>
<td>4</td>
<td>.054</td>
</tr>
<tr>
<td>“HUMAN” AS PART OF NATURE</td>
<td>2.769</td>
<td>2</td>
<td>.250</td>
</tr>
</tbody>
</table>

The current qualitative study had its origins in the findings of a US-South Korea comparative survey conducted by Rutgers University in the USA and the Korean Research Institute on Bioscience and Biotechnology in Daejeon, South Korea. A manuscript deriving from the joint survey was developed for the journal Nature Biotechnology (Hallman, 2005) in which Hallman identified possible factors thought to explain differences highlighted by the survey which called attention to cultural differences, issues of trust, and differences in valence of media coverage. The summary information below compares the results of the two studies designed to elicit public knowledge, awareness and attitudes toward genetically modified (GM) food.
The comparative survey of Public Perceptions of Agricultural Biotechnology was administered in South Korea and the United States in the spring of 2003. Frequency distribution data on selected measures are shown below. Findings show that while Americans are more knowledgeable about the underlying genetics concepts related to transgenic technology, Koreans are more aware of the issues surrounding GM food. The study also finds that Koreans are more disapproving of and apprehensive toward agricultural biotechnology and less willing to purchase foods labeled as containing GM ingredients. According to Hallman, et al, the Food Policy Institute (FPI) at Rutgers conducted telephone interviews with a national sample of 1,201 non-institutionalized adults in the contiguous 48 United States between February 27, 2003 and April 1, 2003, using random proportional probability dialing. The sampling procedure was random but adjusted according U.S. Census Bureau population estimates necessary for proportionate geographic coverage. Using data from the 2000 U.S. Census, researchers weighted the sample to reflect more accurately the racial, ethnic, age, gender and educational makeup of the US population. The 1,201 completed interviews yielded a sampling error rate of ±3% with a 95% confidence interval.

The Korea Biosafety Clearing House (KBCH) commissioned Gallup Korea to conduct a survey based on the questionnaire originally developed by the Food Policy Institute for the identical study of American consumers. The studies occurred back-to-back in each country. The survey was translated into the Korean language with modifications made appropriate for Korean food choices and circumstances. Trained interviewers from
Gallup Korea conducted 1,054 face-to-face interviews in diverse geographic areas (rural and urban) reflective of Korea’s 2000 National Census between April 10, 2003 and May 9, 2003. Interviewers approached subjects outside grocery stores and other public places, briefly described the study, and asked them to participate. To facilitate more precise comparisons between the Korean and U.S. datasets, researchers weighted the Korean data using the same demographic variables as the U.S. data (see above), with the exception of race/ethnicity, using Korea’s 2000 National Census. The sample error for the weighted Korean data was ±3.1%, with a 95% confidence interval. The comparable sample sizes (1054 for Korea, 1201 for the United States) and congruent instruments facilitated extensive international comparisons. The descriptive results are derived from the weighted data. Table 4 below illustrates differences on various survey measures between South Korea and the U.S.
Table 4: US-South Korea Survey Comparison on Selected Items.

<table>
<thead>
<tr>
<th>Question</th>
<th>SK %</th>
<th>US %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of Life will improve as a result of Agricultural Biotechnology (Agree)</td>
<td>43</td>
<td>39</td>
</tr>
<tr>
<td>Genetic modification will make quality of life (WORSE)</td>
<td>57</td>
<td>34</td>
</tr>
<tr>
<td>GM Food is Harmful to Human Health (Agree)</td>
<td>56</td>
<td>34</td>
</tr>
<tr>
<td>GM Food threatens the Natural Order (Agree)</td>
<td>53</td>
<td>47</td>
</tr>
<tr>
<td>GM Food presents No Danger to Future Generations (Agree)</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>It is SAFE to Eat GM Food (Agree)</td>
<td>23</td>
<td>77</td>
</tr>
<tr>
<td>Serious disasters are bound to occur because of GM Foods (Agree)</td>
<td>44</td>
<td>62</td>
</tr>
</tbody>
</table>

Scientific literacy measures, as shown in Table 5 on the next page, reveal that Americans were more knowledgeable about science.
Table 5: Science/Genetics Quiz.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>Korea</td>
</tr>
<tr>
<td>There are bacteria which live on waste water. (True)</td>
<td>94.1</td>
</tr>
<tr>
<td>Ordinary tomatoes do not contain genes but genetically modified tomatoes do. (False)</td>
<td>57.3</td>
</tr>
<tr>
<td>By eating a genetically modified fruit, a person’s genes could also become modified. (False)</td>
<td>68.3</td>
</tr>
<tr>
<td>It is the mother’s genes that determine whether a child is a girl. (False)</td>
<td>72.7</td>
</tr>
<tr>
<td>Yeast for brewing beer consists of living organisms. (True)</td>
<td>76.0</td>
</tr>
<tr>
<td>Genetically modified animals are always bigger than ordinary animals. (False)</td>
<td>57.2</td>
</tr>
<tr>
<td>It is not possible to transfer animal genes to plants. (False)</td>
<td>48.3</td>
</tr>
<tr>
<td>Tomatoes genetically modified with genes from catfish would probably taste ‘fishy’. (False)</td>
<td>59.6</td>
</tr>
<tr>
<td>Genetically modified foods are created using radiation to create genetic mutations. (False)</td>
<td>47.7</td>
</tr>
<tr>
<td>The cloning of living things produces genetically identical copies. (True)</td>
<td>68.9</td>
</tr>
<tr>
<td>More than half of human genes are identical to those of chimpanzees. (True)</td>
<td>54.6</td>
</tr>
</tbody>
</table>

The average American scored 7/11 correct while the average Korean scored 5/11 correct.

However, a much greater proportion of Koreans were aware of GM foods with 79% of Koreans having heard about GM technology, compared to 57% of Americans. Koreans were almost three times more likely to say that they remembered hearing news stories about GM food. Hallman also reports that survey respondents rated levels of trust for various institutions on issues related to GM food. Koreans rated consumer groups, environmental groups and the media as more trustworthy than Americans, who place
trust in medical professionals, scientists, and universities. Government, industry, grocers and farmers consistently received the lowest ratings by Korean consumers. Americans tend to put less trust in consumer and environmental groups, while putting very little trust in the media.

The researcher obtained the raw SPSS datasets for U.S. and South Korean surveys to calculate various aspects of acceptance and nationality. Overall, statistically significant differences are found between Koreans and Americans on acceptance with some findings expected and one unexpected. Expected findings include 1. Koreans disapprove of GM plants (sig .000), Koreans believe it is not safe to eat GM food (sig .000), Koreans believe that GM threatens the natural order (sig .000), Koreans believe eating GM is harmful to one’s health (sig .000) and Americans were more likely to believe that GM poses no danger to future generations (sig .051). Unexpectedly, Americans believe serious accidents are bound to occur with GM (sig .000).

Other interesting findings from the joint surveys which helped frame the current qualitative research include:

- South Koreans and Americans basically have the same levels of knowledge about agriculture (i.e., where does food come from?) with the “lost-points differential” - the average missed question percentages- at 33 for South Korea and 30 for the United States.
• Of South Koreans and Americans who answered that food biotechnology was unacceptable,
  o South Koreans were much more likely to believe that genetic engineering of foods is “harmful to human health and the environment” (41% and 27% compared to 3% and 3%, respectively).
  o South Koreans were much more likely to believe that genetic engineering of foods “violated religious or ethical principles” (25% compared to 14% for Americans).
  o South Koreans were much more likely to believe that genetic engineering of foods was “Just plain wrong” (35% of South Koreans compared to 10% of Americans).

As noted by Hallman, culture may play a key role in acceptance. As pointed out by Bredhal (2001), beliefs about the risks and benefits of GM food are embedded in more general attitudes toward nature and the technology itself, which will be difficult to change. Both of these aspects and others are explored in the qualitative findings below.

Given the quantitative survey findings and Hallman’s reference to culture as a mediating aspect, the intent of the current qualitative inquiry is to elaborate and expose factors that may derive from culture and impact acceptance of GM food.
Culture is that which is ultimately distinctive about humans in the animal kingdom.

Humans are story tellers (language users). Both as individuals and as groups, people like to have a beginning that explains where we come from, a middle that explains how we fit into a larger world, and a future direction that serves to guide us while we’re here on the earth. It is the “story” that places a boundary around culture. Who we are is informed by where we came from and where we are going. It is a “cultural story” which gives us our identity. All cultures to varying degrees have their own story, and are constantly re-told when exposed to other cultures’ stories.

One of the first observations one makes from the qualitative data is the enormity of cultural information that has influence in a person’s decisions about acceptance or rejection of GM food. Multiple cultures can be identified throughout the sequence of interviews. National Culture, Market Culture, Scientific Culture, Food Culture, Political Culture, etc. are examples of identifiable “cultures within persons” that manifest themselves at varying degrees at various times in the discussions. The purpose of this study is to describe these different cultures and illustrate their influence on acceptance of GM food.
NATIONAL CULTURE

“Making and Thinking Scientifically is essential to the American way of thinking” (U.S. Respondent)

“GM Food is definitely not JONG” (Korean Respondent)

National culture, or the type of culture that is ascribed to someone according to the borders of the country in which he lives, is described below in participants’ own words. America(ns) described themselves as: Adventurous, entrepreneurial, loyal to country, diversely spiritual, optimistic, very open, embracing of new technologies, diverse and value acceptance of diversity, heterogeneous. Americans expect that Americans and other people living in America should be unique, but remain “In the salad”, part of a larger affiliation adhering to hyper-values of individual rights and civil liberties.

Participants in the study described American culture as advanced, comfortable; of high quality, designed, spacious, reliable, and blessed with natural resources. Others described American society as possessing the ability to “break away from the past” – a society where renewal is important and where advancement is predominant. Other, less positive Adjectives for American culture included: officious, greedy and money-centered. Americans tend to think of themselves as “exempt” from history and culture, especially if these are seen as “slowing things down or restrictive in some way.” One respondent described Americans as: “abstract individual strivers for whom culture and history are not as important … where efficiency and economics seem to trump any other
values.” Another factor one respondent considered as being American was mobility, “[a] mobile society means everyone is from someplace else—that is the expectation, not the exception as it is with many other societies.” The chance to “re-invent yourself” is another idea that was reported as being an American cultural trait. As an American, an inherent cultural value lies within the opportunity for even the poorest to “make it big,” to have a chance to “break the chains of class and status”, one observer noted. Thus a sense of optimism pervades the culture as opposed to cynicism or pessimism.

There were optimistic sentiments expressed by Americans in terms of technology, “we are on the cusp of what the Internet can do.” The concept of freedom was deeply tied to science and technological pursuit and innovation in general. The development of ‘wild west’ values of individuality and healthy skepticism tempered by experience is still present in Americans. “Making and thinking scientifically, and using technology is essential to being human and is reinforced in American ways of thinking.” Respondents felt this cultural trait was reinforced in America because S&T blossomed just as the unique system of American government developed. Thus, generally speaking, the technology-embracing American culture might be more accepting of, or at least less suspicious of, GM foods, which are made possible by technology.

Americans describing South Korea(ns) focused on economic accomplishments as most impressive. “[Korea has] made a lot of industrial (and now technological) progress, poured more concrete and dug more tunnels for roads in 40 years than any other
country” according to one American observer. There was also an acknowledgement of
traditional or rather ancient technological expertise as Koreans were described by
Americans as being innovative especially related to agriculture, specifically in the design
of rice paddy irrigation systems – dykes, which were robust against monsoon rains.
Americans were highly complimentary of Korean high technology and rapid
development. Some observers mentioned recent Korean advances in stem cell research
as evidence of advanced science and technology in Korea.

There is also an impression of the Koreans as victims of war and isolation. Korean
society was viewed by some American respondents as changing rapidly economically
and becoming politically more progressive, a change which places strains on what has
traditionally been called the “hermit kingdom.” “There are BIG generational changes”
occurring in Korea, according to one observer. In summary, the Americans recognized
Korea as “proud of its heritage,” but Americans were more likely to emphasize
economic progress and advancement, which appears to resonate with self-ascribed
American values.

South Koreans describe their own culture as being governed primarily by human
relationships, “warm and friendly, connected” and secondarily talked about Korean
society as advanced and modern. Korean observers agreed that Koreans care a lot about
each other. They are compassionate, interested in others’ welfare. The salience of human
relationships is also captured in two quotes, one from an American and one from a Korean respondent:

- [Americans] get mad and get over it in the US-not necessarily in Korea
- Personal relationships also are more important [in Korea] than qualifications in promotions and getting ahead.

Some Koreans interviewed felt that the personal caring was a problematic aspect of this otherwise admirable cultural trait as one Korean described the converse, [Koreans are] too helpful, too knowledgeable about each other’s personal lives.” Several Korean respondents in describing how living in America affected them specifically noted their increased awareness of self. To elaborate, prior to coming to live in America, many Korean respondents said they did not see themselves as separate from their group affiliation. Self-referents included membership in the collective, for example, the family, the university, the neighborhood. A sense of privacy was absent for one respondent who said she never understood the concept of privacy prior to living in the U.S. She related that she never knew she could possess private thoughts (not known or shared by the group). This new sense of privacy led this particular respondent to develop new ideas and considerations about her own personal preferences including major issues such as sexual orientation. She described this as a “new powerful force in her life.” Other Korean respondents described a lack of openness to discuss moral issues in Korean culture. “When you are growing up you go with the flow” and do not question individual morality or authority. On issues of personal justice, one respondent described how his parents always deferred to the judgments (even wrongly) of school officials in conflicts
over discipline in elementary and secondary school. One Korean respondent acknowledged receiving an award in elementary school for being “quiet and cooperative.” The question arises whether a suppressed sense of self as an individual and a lack of social freedom to discuss new (potentially controversial) ideas (without fear of reprisals from authority) leads to risk-avoidance behavior at the societal level.

Korean culture has shifted very quickly from resource scarcity, poverty and survival in post-war Korea (after the armistice of July 27, 1953), to a high level of comfort and quality of life. This is attributed by some Koreans I interviewed to the country’s embrace of science and technology and pro-growth industrialization policies. Korea today has the highest broadband penetration per capita of any country (Economist, July 2-8, 2005). Koreans I interviewed described themselves as enjoying their cosmopolitanism yet also acknowledged that the pace of change is tearing them away from their traditional roots. This is summarized by one respondent’s quote, “Koreans want to eat rice three times per day, but lifestyles won’t allow it.” In other words, GM foods, with their attribute of “modified” aggravates Koreans’ already heightened sense of loss of control over what they eat. A question thus arises as to whether or not rapid change in society leads to heightened social awareness of status and justice and whether or not a feeling of loss of control ensues under conditions of conflict between new and modern conveniences and culturally established ways.
Two central cultural values in Korea described by interviewees are the terms Jong and Hun. Wanne (1982) also describes these cultural sentiments. Koreans say that feelings of Jong and Hun complement each other, and can not exist in isolation.

- **Jong** is a (positive) feeling of attachment…Applies wherever one feels closeness or emotional affection, comfort.

- **Hun** is a (negative) feeling of distance…Applies wherever one feels sorrow, regret, anger or angst.

Koreans derive power from Hun, which can be in the form of suppressed anger or dissatisfaction –for example the Korean people have very strong Hun for the Japanese colonization period in Korean history, “We will take revenge one day” is the sentiment according to one Korean participant. A second example of Hun given by an interviewee described the feeling of Hun that is created if a virgin dies accidentally. In a premature death she has been “cut off just before blooming- cheated” out of a full and fruitful life. So she has Hun. Therefore “she may appear in dreams of others and her spirit is still vigorous and purposeful even in death to others who are living”.

Koreans derive positive peace and comfort from Jong. There is a saying in Korean: “Shin To Bul Ee (BODY and SOIL are INSEPERABLE).” That is, according to one respondent, “it is not possible to separate Korean people from their land.” This saying is a positive force (Jong) expressed in contrast to GM food, as a preference for domestic, organically grown food. The closest Christian correlate perhaps is “God created Adam
from the dust of the earth.” Korean participants all identified with this sentiment and knew the meaning, “we are the Korean people, we are human beings, and fed from the soil of Korea with vegetables and fruits and grains— not from US soil.” In summary, one respondent reported that “A philosophy like ‘shin to bul ee’ has a long, long time presence in Korean culture. These are words from our ancestors over 5000 years ago…GM food is definitely not Jong”.

Another cultural trait described by Korean respondents includes the notion that Korean people are spiritual—Hun and Jong is an expression of this spirituality, “We believe in good and evil; Korean movies always have a happy ending.” Koreans feel that intelligence is equated as “good enough in West.” Whereas Korea values emotional purity traits, “if you get smart enough, it’s not in a pure heart, or if you get religion, this has nothing to do with the quality of a pure mind,” according to one participant in illustrating this point. Korean people will accept outside elements from other cultures if they come with this purity and natural goodness.

Another example of “pure intent” was illustrated by one participant as he told the story of [American] missionaries who provided medical services to Korean people in recent history. Koreans accepted these medical technologies along with foreign religious practices (Catholicism) because of the perception of “pure intentions.” “But GM has no purity or benefit except to the U.S. only,” according to one respondent. GM food is equated as “intelligent,” and that is an insufficient condition for acceptance in Korea.
MARKET CULTURE

“We are defenseless” Korean respondent reacting to a question about import of GM food

American and Korean market forces are at odds. American market culture is diverse and thus accepts GM food as a harmless choice. U.S. agribusiness pushes for widespread acceptance whereas Korean market culture does not accept GM food due to the threat felt by consumers and Korean food producers, including farmers. Trade issues have an impact on consumer choices and the market cultures of each country reacted differently to GM food. The American market does not depend on imports of food and the variety of imports to the U.S. creates a market whereby consumers have many choices. Korean consumers may not want GM, but scarcity requires GM imports until such time as Koreans can become self-sufficient.

Market culture affected the GM food issue early in the development of the controversy (1990s). The main problem according to several U.S. respondents was U.S. corporate protection of intellectual property investments. Driven by competition, the corporate secrecy that protected intellectual property created a climate of less than full disclosure about the new GM technologies. Further, this secrecy combined with the fact that most benefits accrued to producers (not consumers). Corporations were faced with the decision to highlight producer benefits to consumers (such as reduced pesticide use), but in so doing, the corporations would have called attention to the high levels of
environmental hazards, which occurred under conventional (non-GM) methods. The choice of corporations not to engage in a complicated public marketing campaign means that U.S. consumers were not made fully aware of how GM foods and crops were produced. The corporate strategists instead decided to spend their money on lobbyists to avoid labeling and justified their decisions not to educate the public due to the benefits deriving to producers, and because the scientific community had in effect determined that GM crops were not “different” in effect from non-GM crops. The corporate need for secrecy and the scientific approach to risk assessment coalesced, and no media coverage followed because the producers were not particularly worried about potential risk to the public, and the scientists did not have any evidence to the contrary. Company strategies were geared to U.S. markets where consumer awareness is typically low to nil given Americans’ faith in the regulatory and market systems to protect them. In other markets such as Europe and in Korea, these same set of circumstances did not exist and large agribusiness engaged in GM crop development without being proactive in the marketing of these products, nor in educating the public for largely the same reasons as the U.S. market. Korean consumers have their own sense of market expectations which will be discussed in the section related to Food culture.
FARMING CULTURE

“In Korea, people know who the farmers are by name”  --Korean respondent

“American farmers are on a technological treadmill”  --American respondent

“Good people means those of PURE HEART like farmers,” as described by one Korean respondent. Farmers are a pure representation of Korean forefathers and the good and natural that is the basis for Korea’s existence. The cultures of American and Korean farmers are very different.

American farming was “late blooming.” The first settlers to the U.S. had enormous new challenges to overcome in the newfound land. They needed to learn what grows, where and when it grows best. Earliest settlers in America sought new tools to help production and experienced trial and error in agricultural development. Early farmers found themselves constantly having to innovate to be successful (primarily with Maize) in America. The rapid ascent of science and the industrial age accompanied America’s westward expansion and placed continuing pressure on efficiency as a central value in the development of agriculture.

Compare that type of cultural framework to the Korean dike and levy system that had been successful (and unchanged) for 5,000 years. Basically we can see that products like GM foods that have benefits that accrue to producers primarily would be welcomed in a culture leaning toward technological advance and competition. Arguments by GM
advocates based on producer benefits will find Korean farmers lacking in demand. Korean farmers are “slow to adopt new technologies due to very deep roots in traditional practice,” according to one observer.

According to one American interviewee, American farmers are “on a technological treadmill.” To remain competitive, US farmers must squeeze every bit of efficiency out of each acre. In Korea 20% of the workforce is identifiably in the agricultural sector, while a comparable figure in the US is just 4%. This fact alone means that American producers must be highly efficient in comparison to Korean counterparts. American agriculture relies on S&T to drive innovations—leading agribusiness to search for new and improved GM seed. American farmers know this and believe in S&T whereas Korean farmers are apparently not so easily convinced. Beyond the logic-based American cultural rationale in interpreting this finding, Korean farmers also are symbolic of deference to tradition. That is, Korean farmers represent 5,000 years of food tradition.
**FOOD CULTURE**

“Americans eat well to work well, Koreans eat well to live well” -- author’s quote

American Food Culture may be summarized as the “Supersize me” effect. “The majority of people in the USA do not care what they put into their bodies” according to one respondent. In American culture, food is an ingredient in life’s pursuit of productivity, leading one respondent to remark, “the question is not what’s for dinner, it’s when’s dinner over?”

Korean and American respondents identified the same observations of American food culture. However, the contrast was more quickly identified in the descriptions of Koreans than Americans. Among U.S respondents, quality was a secondary factor to price and quantity. “You don’t see people eating alone in other countries as you do in the USA,” according to a Korean respondent. It would appear that Americans’ general lack of concern for food generally, translates into a lack of interest in whether or not the food is GM. None of the Americans displayed any specific knowledge of Korean food culture.

In Korea, there are many distinctive foods (up to 2000 distinct varieties). Again, “Shin To Bul Ee” – “The soil and the body are inseparable.” Food is identifiable by tradition, by functionality and all Koreans share this understanding. “Tradition” in food culture is a key element in the rejection of GM food in Korea according to interview data. For
example, food production is traditional in Korea. Korean ideas about quality food are related to naturalness and “coming from the earth.” South Koreans eat for health and use food in medicinal or purposeful ways. Purity is therefore important. Brown, or earth tone, is assumed to be more natural and pure for food appearance. There is a strong orientation to organic and natural foods in Korea. The organic section at the local Korean grocery has a big picture of Farmer Kim smiling down on his produce. Korean people like that and trust that, “I don’t think they would feel the same way about Prof. Kim the GM crop scientist smiling down on his golden rice” according to one respondent. Korean and American scientists that I interviewed mentioned there is a public misperception that organic equals safe. According to both Korean and American scientists, the chance of encountering toxicity in organic foods is much higher.

As mentioned earlier, food culture has a market aspect. In the individual decision to purchase food, whether GM or not, Korean women said they look at price and health benefits, Korean men just “purchase the first product they see,” leading one respondent to make a suggestion to GM food producers to place [GM food] at eye-level on the shelf in order to sell to males. Koreans take great care in selecting food according to the following statements derived from interviews about food:

- I match vegetables with meat to assist with digestion.
- I eat a lot of meat because it is cheap in the U.S., but I stopped buying it temporarily when I heard about mad cow disease. Then [I heard] symptoms might not be seen for ten years, so I said what the heck.
- Organic is preferred even when there is 20 cents difference in price.
- My family’s preferences greatly impact my food choices.
- I buy more expensive meats-because I just feel like it might be better.
- Korean man likes Korean food. He has to eat Korean once per day.
- Korean food is better for Koreans because of the absorption into our body.
- Heard that there are many chemicals and salts added to American food.
- American salt has chemical additives and is not natural salt.
- American food is geared for convenience-it takes a long time to prepare Korean.
- Americans spend more time decorating for parties than preparing food –“pot luck” concept is not familiar in Korea.
- Food is much more entrenched in social relationships in Korea, than in America.
- We put our devotion into preparing food-when we do that, it tastes better AND has better nutrition (italics added by author).

There is also evidence from the data that a close association exists between food and physiological characteristics of people. This was expressed only by Koreans.

- People who eat spicy food have a stronger character and hotter temperament than others [who don’t].
- Red pepper was introduced into Korean culinary culture later, since then, Koreans’ characteristics have become “harsh and hasty”. The stronger the food, the more people are attracted to it.
- Koreans prefer room temperature drinks.
- Americans have a stronger stomach than Koreans because they drink cold drinks.
- Korean moms want to feed their babies American desiccated milk so they can be tall and strong like American children—they used to sneak it from army camps before it was on grocery shelves.

The intersection of Food Culture and Trust is interesting in examining GM food acceptance. Koreans are interested in natural foods and how they affect their bodies and [Koreans] are reluctant to embrace things from other countries, “We check the label to see where food is from—especially China.” One respondent reported that “if I was living in Korea (not USA), I would be more careful about what I ate.” Thus, it appears from the data that food acceptance changes according to relative degree of trust in foreign food regulatory systems.

Koreans mistrust the food production chain in Korea primarily because they see the scandals of food processing companies cutting corners on the nightly news. Americans don’t have to check on food quality themselves; “the convenience society” has put in place a framework for food safety that is trusted (i.e., the Food and Drug Administration, U.S. Department of Agriculture and the Environmental Protection Agency). “The Korean government has told untruths in the past and they failed to punish the food processing companies and don’t mandate disclosure of the food production process,” according to one Korean participant who echoed the sentiment of nearly all Koreans in discussing mistrust in the Korean food regulatory system.
Generally Koreans seem to be much more skeptical of food, and specifically less trusting of food that does not appear natural. One respondent said he doesn’t trust food that looks too good, too perfect. He peels that “very red, very shiny apple very deeply”. In another example, an interviewee buys whole steaks and not ground, because she “does not trust that something else might have been ground up in there without her knowing.” Koreans are also skeptical of foods especially when media coverage is negative, “I used to eat a lot of seafood, but it is not recommended to eat seafood in America… fish caught from Western oceans is especially not good for children to eat.” She based her opinion on a show she watched on American TV where salmon and tuna were singled out as unhealthy due to localized environmental pollution and she ascribed these findings to all “western oceans.” However, she thought crab was OK, “so we eat a lot of crab.” Crab has, according to one food scientist, a much higher chance of toxicity and food borne illness than fish. One respondent heard that even the seafood available in the local Korean Oriental grocery is not safe because it is “from China.” One respondent commented on the reason for a heightened sensitivity is due to scarcity during the war years. Unscrupulous producers, ineffective regulation of food safety, and scarcity all combine to make food, which already has 5000 years of tradition, a sensitive issue.

**TRUST**

Trust refers to a society’s general acceptance and belief in their institutions, such as government, science, medicine, media, and specifically related to GM food, food producers and government regulatory systems. As already identified by Hallman,
Americans and Koreans trust different institutions within their respective societies. Americans and Koreans converge in their confidence in the U.S. food safety system. According to one respondent, “Americans don’t have to check on food quality themselves--the convenience society has put in place a framework for food safety that they trust--the FDA.” Another American said, “it’s the market that we [Americans] trust, not the government.”

The Koreans trust the U.S. system more than their own, “We have the FDA and USDA and EPA equivalents in Korea, but, we still don’t trust them.” Koreans place high amounts of trust in the Korean media, leading one observer to remark, “Koreans mistrust the food production chain, primarily because they see the practice of putting unhealthy ingredients on the T.V. news. The government has told untruths in the past and they don’t freely disclose the process of food production.”

Several Koreans interviewed noted that trust in science has been abused by the media. As one Korean scientist interviewed said, “A respected Korean Agriculturalist with a science background told everyone on Korean TV that GM was absolutely dangerous.” The interviewee went on to point out that these remarks were irresponsible, “but of course everyone [in Korea] believed it.” Given the importance of Korean food being “home-grown,” the researcher asked if there would be less resistance if GM crops were grown in Korea. But “Shin to Bul Ee” could not overcome the issue of mistrust as one
Korean respondent reacted by saying “we doubly don’t trust our scientists, governments or business interests to look out for our welfare!”

I turn now to a discussion of Hofstede’s cultural factors and make some comparisons between the U.S. and South Korea on national culture and acceptance of GM food.

**INDIVIDUALISM**

*Individualism (IDV)* according to Hofstede, focuses on the degree to which the society reinforces an individual verses a collective focus. *High Individualism* indicates that individuality and individual rights are paramount within the society. Individuals in these societies may tend to form a larger number of looser social relationships. *Low Individualism* typifies societies of a more collectivist nature with close ties between individuals within social groups. Collectivist cultures value taking responsibility (i.e., caring) for fellow members of the group. For GM food acceptance, individualism is expected to influence both decision-making and preferences GM food.

The interviews showed many examples of differences in thinking between Americans and Koreans attributable to individual-group reference in the acceptance of GM foods. In Korea, the individual is sublimated to the group. In the U.S., individualism is valued and promoted such that decisions are formed based on individual experience vs. group welfare. In Korea, decision-making centers on concern for group welfare for example in the case of GM food on the family’s health and the shared responsibility of “caring for
future needs of our children.” Protecting the health of future generations was cited as a key reason for not accepting GM foods “with even the smallest possible risk.”

References to the collective are evident in Korean’s descriptions of where they get information about GM food. In Korea groups such as the media, NGOs, and the scientific community take positions on issues of public interest. Korean people, not necessarily knowing the facts, form opinions based on trust or perceptions of connectedness with an institution or group. According to one respondent, “NGO opinion is not representative of public opinion, but they [NGOs] have a strong influence on media coverage, which does impact public opinion.” One Korean media study examined three hundred and twenty-nine articles (329) from six (6) major newspapers in Korea and showed that seventy-seven percent (77%) of articles cast GM food in a negative context (Choi & Jo, 2004). A similar study of one hundred and seventy-two (172) articles in major newspapers in America revealed that only fifteen percent (15%) were negative (Thompson & Dininni, 2003). This indicates a strong potential influence on opinion for both Americans and Koreans is based on the valence of media reports. Another group to which the Korean public ascribes the role of upholding the protection of the public interest, is NGOs, especially in a society such as Korea’s where the government is not perceived by the public as fulfilling this role. Scientists on the other hand, are largely mistrusting of the motives of NGOs according to the interviews. Several scientists interviewed lay the blame for the negative reaction to GM food at the
feet of NGOs citing “anti-science” mentality, or “misusing science” to further their political objectives.

Koreans, in contrast to Americans interviewed, were much less willing to seek first-hand information or advice from scientific or medical experts in deciding whether to accept GM food. Many Koreans made food decisions because they cared more about information from people within their network of close-knit groups such as “my husband, father, mother, mother-in-law, friend, doctor, deacon, etc.” In the interviews, Korean respondents said they get information about food mostly from close associations as in the following quotes:

- We [Korean] get information on food from family, friends and social circles-friends here also studying at Texas A&M;
- I also go to Internet sites with Korean news-rather than CNN;
- My church deacon is also very influential (Korean respondent);
- Television is a big influence on older Koreans--especially television, as it was introduced while they were growing up, and they remember getting reports that were important to them.

Although deference to group norms was apparent, the interviews also provided evidence that South Koreans’ decisions to accept GM food were also influenced by comfort in asserting their individual opinions. This led to seeming contradictions where a Korean respondent accepts GM food if eating for oneself, or if living in America, but rejects GM
if choosing for oneself in Korea or purchasing for others whether living in Korea or America. Or, one accepts it for themselves and even their families, but feels hesitant to bring up a disagreement with someone he cares about (e.g., parents) about the safety or acceptance of GM foods. In the words of one Korean respondent, “I can’t hurt them.”

Extending the point further, Koreans pointed out that in Korea, the mother always respects the father and she makes the food choices. Therefore she will not want to put her husband (or children) at risk. Koreans thus seem to be much more willing to acquiesce to (i.e., choose to embrace) group influence and to respect seniority than do Americans.

Individualistic Americans primarily looked to their own experience and then to experts, whereas Koreans looked first to family and then media. It would thus appear from the interviews that individual-group orientation has a strong influence in GM food acceptance first in terms of accessing sources of trusted information, and second in terms of the context or affect of their decision on others. In Korea this means culturally, acceptance or rejection is driven by learning about GM food from immediate family, friends and social affiliations, and en masse from Korean media, which was largely negative.

Whether the Korean media had access to or sought the opinions of scientists in Korea is not covered in the interviews, however, Korean media might have faced the same difficulties understanding the scientific communities’ lack of consensus on risk or even
the scientific concepts involved as described by one American scientist commenting on
the lack of understanding prevalent even in the U.S. media coverage, “[they] are
woefully ignorant.” The NGOs in Korea, as a group, were also highly vocal and filled a
void in societal trust where Koreans felt that NGOs could be trusted to protect their
interests.

UNCERTAINTY AVOIDANCE

“People think in their subconscious that Frankenstein will be born” American respondent
in discussing why people generally might reject GM foods.

“We (Koreans) have safe food. Why should we have to suffer from these GMO hazards,
even the slightest infinitesimal risk?” Korean respondent in discussing why Koreans
might reject GM foods.

Uncertainty Avoidance (UA) focuses on the level of tolerance for uncertainty and
ambiguity within the society. High Uncertainty Avoidance (Korean culture) indicates
a culture has a low tolerance for uncertainty and ambiguity. This creates a protection-
oriented society that institutes societal (both social and legal) controls in order to reduce
the amount of uncertainty and risk. Low Uncertainty Avoidance (American culture)
indicates a culture that has less concern about ambiguity and uncertainty and has more
tolerance for risk. Low uncertainty avoidance (high in South Korea and low in the U.S.)
is expected to be a factor in greater acceptance of GM food. The expectation is that
Americans will attribute less concern for risks associated in GM food and therefore base
acceptance in part on high tolerance for uncertainty, whereas Koreans will take the opposite stance and reject GM based on lower tolerance for uncertainty, as is described below.

The “dark side of the black box of GM” is real to people in both American and Korean interviews. The scientists say that NGOs take advantage of this black box because no one, especially scientists, can absolutely refute the possibility of risk. That is why Korean people are taking precautionary steps. Korean people believe if they accept the benefit, they also must accept the risk. It is plausible, but the question was not specifically asked whether Americans’ willingness to accept risk is in some way tied to the opposite of Koreans’ belief that they must accept the risk and the benefit. Perhaps Americans feel they do not have to accept the risk because of their faith in science and technology and trust in the institutional frameworks to protect them from extensive harm if risks materialize.

Americans and Koreans think of the level of risk as being mediated by regulation and markets. “Government policy is influenced by professionals and experts” according to one American’s statement, “governmental policy making process is seemingly rational, pro-science but public assessments operate in very non-utilitarian ways.” To understand American conceptions of risk, one respondent said that one has to understand the concept of risk in utilitarian terms. “Utilitarianism is a family of ethical views that have in common the assertion that right actions and institutions maximize aggregate
happiness, and so cost benefit analysis is the economic tool designed to assign and measure the market’s reaction to these perceived costs and benefits.” Regulatory agencies will assign a formulaic (seemingly objective) to benefits and risks and then come up with a (usually quantified) assessment. Whereas what the public (or non-expert community) does in distinguishing risky verses safe, is first determine what is familiar—traditionally or culturally. For example, Americans are accustomed to foods being “new or improved” (read changed or modified), and thus do not react to “newness” in food. In contrast, Koreans expect their food to be earth tone, natural and one of two thousand recognizable foods with known (unchanged) characteristics and functions. Therefore, governmental or scientific conceptions of risk are fundamentally different than the public’s (cultural) concept of risk--for example when there is a new way of managing crops or adding benefits to food production. GM food may be rejected as risky at the “cultural common sense” level, even if the science all points to risks being miniscule. As one respondent said, “[It is] far more risky to ride in a car or an airplane, but these are so familiar that people accept this risk, especially when you have [more obvious] benefits that accrue to the end user [public] through this product.”

The context of risk and choice are key factors. Both Koreans and Americans make rational choices. For example one Korean respondent said when traveling with friends in the US, “buying GM tofu is OK because the cost of searching out non-GM varieties is too high, even if it could be done, which, without labeling is doubtful.” In Korea, according to one respondent “safety always comes from home and not foreign countries
or multinational agri-business.” Although Korean respondents did not wish to acknowledge they were averse to risk, the statements of a preponderance of interviewees lend support to this factor as salient in their acceptance of GM food. Koreans seem to be willing to eat GM if it could be “guaranteed.” It also seems that in the absence of information, people will produce the facts, and in the face of the facts, people will construct how or if those facts apply to them.

Most Americans interviewed did not know they had eaten GM foods. They also didn’t know they had eaten DNA on a regular basis. An American scientist supposed “If [Americans] were educated about that fact alone, they would reflect on the fact they have not had any ill-health outcomes and therefore not think anything bad comes from GM food.” This seems reasonable from a western or scientific cultural viewpoint whereby experience and logical inference are predominant values. However, Koreans also said they would accept GM food if it could be “guaranteed”. Thus it seems the standard for risk avoidance is higher in Korea, extending beyond immediate experience, and into cultural realms of concern for future generations and past tradition, described by Hofstede as a long-term orientation which is discussed in the next section.

**LONG-TERM ORIENTATION**

**Long-Term Orientation (LTO)** focuses on the degree to which the society embraces the long-term view. **High Long-Term Orientation** [Korean culture] indicates a culture that adheres to the values of long-term commitments and respect for traditions from the
past and expectations for the future. **Low Long-Term Orientation** [American culture] indicates a culture where referents to tradition are less strong and change can occur more rapidly. The expected influence of LTO on GM food acceptance is that Koreans will not accept GM food because GM food does not fit traditional values derived from a long history of tradition in agriculture, and especially the long history of food’s role in society.

Yet, the LTO of Korean culture may be eroding in the generation born after the Korean armistice. Evidence from a study by Gillett, Nayga and Onyago (2004) found that consumers aged 20-29 were far more likely that consumers aged 50-59 to approve of using GM to create both plant and animal-based food products. There is a generation gap in Korea, with one respondent pointing out that those under 30-something are very “westernized,” perhaps having more traits based on logical reasoning, science, technology and modernity. He goes on to say:

> But my parents’ generation and my generation are not as globally acculturated with an affinity to the West. If it is GM AND part of a Big Mac, it is accepted [by young people]. Neither the GM nor the BM [Big Mac] is accepted by the older generations.

Another element from the interviews supporting long-term orientation as a relevant factor in acceptance or rejection of GM foods in Korea is filial piety. “**Seniorship**” describes Korean culture where older generations are accorded higher respect without a
quid pro quo. As one respondent said, “We [Korean people] take time for the traditions of our ancestors…we value the virtue in things, the virtue in ideas, the virtue in life which derives from these traditions.” In contrast, an American respondent noted, “I do not have to be concerned with the future possible negatives because of my faith in S&T to deal with that eventuality.” A Korean respondent, when asked if she believed Americans are concerned about the future said, “Not enough…The US largely does not recycle. If we don’t take care of the land (physical and environmental resources) we risk losing it.”

The long-term orientation seems most strongly evident in food and farming culture where Korean people were very sensitized to the concept of Shin To Bul Ee. In contrast, the younger generations were also more imbued with a value framework that embraced science and technological development and trappings of western culture. These are obviously more recent influences on Korean culture. Thus, long-term verses short term orientation’s effect on GM food acceptance surfaces within primarily food (including farm) culture and scientific culture. Korea’s rapid economic and technological development seems to indicate that long-term orientation in a culture does not preclude rapid change. And that rapid change does not preclude long-term orientation in terms of traditional food culture. An interesting contrast is Korean society’s welcome acceptance of stem cell technology and progress toward the morally controversial (in America) therapeutic cloning breakthroughs which were championed by Korean scientists and
which have become a source of national pride. Perhaps the scientifically advanced society is in the minds of Koreans today as a new cultural tradition.

**POWER DISTANCE**

“We are negative toward GM, not America” --Korean respondent

In Hofstede’s work, **Power Distance (PD)** focuses on the perceived degree of equality, or inequality in power distribution between people in a society. **High Power Distance** (South Korea) indicates that large inequalities of power are perceived to exist within the society and that people do not feel empowered to change this condition. **Low Power Distance** (America) indicates a society where people perceive low differences in the distribution of power and wealth. In these societies equality and opportunity for everyone is touted as the norm. From the interviews, it was difficult to capture power distance as defined by Hofstede. Rather, **political culture** is used here to describe concepts drawn from the interviews.

According to one Korean respondent, “The government is neither pro nor anti GM food in Korea.” Korean people feel the government is paralyzed and express frustration over that fact. “People want the government to take a stand, back the scientific and take leadership on the issues,” according to another Korean respondent commenting on his view of the desired government role in the GM food debate. Yet, another Korean cultural factor limits the expression of that frustration, “We think of the government as a
senior family member, and therefore we [Korean public] quietly listen as juniors in respect for our elders.” Koreans feel that political realities necessitate dependency saying in effect, “[we] did not like our government giving in to US import demands.” Thus American domination of the GM food imports leaves Koreans with little choice. Another Korean commented that “Wealth is greater but choice has not caught up to our societal self-image --as children we used to chase after American soldiers begging for chocolate bars.” Although Korean society has achieved a high degree of wealth, Korea is still dependent when it comes to food.

Comments from a pair of Korean and American respondents illustrate the salience of political power gaps:

- [Americans] would lobby the government to do something [if GMOs were found to be harmful], but [Koreans] would never think to upset the government’s position--never think to be against the government.
- Lobbying has negative connotations in Korean culture--associated with dirty politics and bribery.
- Bill of rights in the U.S. protects individual freedoms--gives Americans a sense of security from government persecution.
- Never go against the government--or he/she can disappear.

A second message emerged from the statement of one respondent and was echoed in several subsequent interviews with other Koreans.
There is a double standard here. Although the US has developed the genetic map (Genome)—and GM foods, we see the US exporting to foreign countries rather than distributing to domestic (US) markets for American consumption.

At one level, there was a perception among some Koreans that the [U.S.] government has a different standard when it comes to GM foods. One respondent made reference to “when these [GM] crops are given to black people [referring to Africa] or those in developing countries,” there was the distinct perception that the US was *experimenting* on the safety of GM foods at the expense of those who “don’t have much choice”.

Another comment reinforced this perception, “While in the States, the FDA enforces strong regulation on domestic food markets—there may be a double standard [for other markets-Korea included]…that makes me reluctant to buy GM Food.”

The implication that the U.S. is exploiting weaker countries was a surprise finding and not noted by any Americans interviewed. Perhaps just as the Americans saw the Korean culture through the value-laden lens of economic well-being, Koreans may have projected mistrust in U.S. motives based on their own lack of trust with the Korean government’s unjust treatment of food processing offenders or by association with other types of Korean institutional actions that exploit the people of Korea or other nations. Koreans feel they are politically less powerful in the international arena, with one interviewee stating, “We wish the US would take more care (research possible ill
effects) before exporting” and “We depend on a conservative approach especially when we have so little power.”

In effect Koreans may not like GM food on a “gut level” if it is associated with exploitation and inequitable treatment, which could be interpreted as a very distant sentiment compared to “pure intent.” Koreans trust the media. One Korean respondent referenced a news story he heard about the U.S. Pharmaceutical industry testing new (HIV) drugs in Africa conducting human trials—because they [the U.S.] can’t conduct these tests on Americans. He said, “They call it medical aid, but the motivation is contrary to valuing human life—for greed. Maybe it’s the same for GM Foods!” Thus, when proponents of GM food claim that their goal is eliminating malnutrition or helping less developed countries eliminate disease, etc., the argument in the Korean perception attaches to a pre-existing negative cultural association of exploitation (e.g., testing potentially unsafe HIV drugs in Africa).

On a political level, Koreans know that the NGOs [Non-governmental organizations] are biased. Korean respondents reported knowing that NGOs are not representing the facts. But in the absence of a government or corporate culture that protects consumers or argues for consumer welfare, “NGOs are all there is.” In Korea, NGOs are a by-product of the newly established democracy, and in fact are promoted by U.S. government policies. Yet, these nascent NGOs exist in a milieu of immature democratic organizational interests at the national level. The most recent election of President RHO
Myu-hun represents only the second time Koreans have directly elected their top political leaders. The Korean NGOs, because they are new, do not have diverse representation (pro-con), nor do they exist in a milieu of other mature democratic institutions that might balance the influence in public opinion and information sources. The same could be said of the Korean media, which reflect a homogeneous group of mass communications corporations. Korean NGOs proliferated about the same time GM foods were hitting the market in Europe. Thus, NGOs in Korea looked to European models for ideas about causes and missions. NGOs are well-funded and command a strong following because the government all too often fails to enforce justice and protect the public. Farmers support the environmentalist NGOs because they have a common interest in protecting Korean agriculture.

**MASCULINITY**

“We put our devotion into preparing meals” *Korean respondent*

**Masculinity (MAS)** focuses on the degree the society reinforces, or does not reinforce, the traditional masculine role model of male achievement, control, and power. **High Masculinity** indicates the country experiences a high degree of gender differentiation. **Low Masculinity** indicates a country with a low level of differentiation and discrimination between gender roles and where males show nurturing traits. The expected impact on acceptance of GM food is that Koreans will show more consideration and concern for the welfare of others (considered in this analysis as a
feminine trait) than Americans. And Korean males, in particular, will demonstrate these traits similarly to Korean or American females.

Americans were very focused on their individual freedom to choose, and did not offer much data on the question of concern for others’ welfare. Perhaps that is evidence of America’s high cultural “masculinity.” There was some support from the Korean interviews to reject GM food based on what Hofstede refers to as low masculinity. “[South Koreans] care a lot about each other,” according to one male Korean respondent. This is expressed as a caring trait with concern for children showing up strongly in both Korean males and females. At the level of deciding whether to purchase GM food, as a form of acceptance, a Korean male “would buy GM products for myself but not for my family.” In discussing gender equity, the point was made that in Korea, “men used to receive extra points on exams over women because they were expected to serve in the military.” This has now ceased. Korean females consistently expressed deference to the wishes of the males or significant others in their family. Caring for group welfare admonishes all Koreans to pay attention to who is eating GM food as a strong consideration in any decision to purchase or approve of it. “My family (mother-in-law especially) is very influential in guiding my opinions, especially related to food and health,” as one respondent illustrates. Generally males and females in Korea showed a similar caring trait, whereas no evidence of caring, expressed as protecting future generations, was expressed by American males or females.
SCIENTIFIC CULTURE

“Nope, God also gave you a brain” --American respondent when asked if scientists were playing God with GM food?

Scientific culture as earlier described by Olugbemiro (1997) is a set of values, ethos, norms, and practices based on universalism, logical reasoning, organized skepticism and belief in the tentativeness of empirical results. Applying this framework to the interview data we see support for scientific culture represented in the rationale of both American and South Korean respondents’ acceptance or rejection of GM food. As expected, scientists’ comments supported the “deficit model” as represented by two quotes, “if only people understood the science, they would be more accepting,” and “We need science to temper irrationality.” But overall, the interview data did not support the contention that possessing knowledge of the science or technology (or calculable risk) would lead to acceptance in Korean culture. The study found that, in contrast, both Americans and Koreans used aspects of scientific understanding to both accept and to reject GM food.

Non-scientist Koreans and Americans demonstrated rationality and other qualities described by the presence of scientific culture (e.g., skepticism, logical reasoning), and most demonstrated at least basic knowledge of the science and technology involved in GM food production. Korean interviewees stated that regardless of the source of their information, the “validity of the data presented are important for credibility.” In fact it is
the element of *skepticism* in particular, which is inherent in scientific culture that drove most of the rejection of GM food:

I don’t think it is necessarily true that knowledge of science is a force for acceptance in Korea—because people understand that science today is not 20/20. They understand that science is progress and not able to guarantee that everything is accounted for…scientists themselves of course know this, but so do regular people. *Korean respondent*

While Americans expect science and professional expertise to be represented in government decision-making, Koreans do not. There is an assumption that the government is not considered a source of objective, non-politicized views. Rather, the Korean government is perceived to be a stakeholder in a particular agenda. Koreans possess a scientific cultural outlook on science and society issues, but the issue of food is associated with 5000 years of tradition, a lack of trust in the government, and is associated with a high threshold for skepticism over future risks.

The nomenclature “GM” may also have had an effect culturally. Scientists say they are not modifying nature in a substantial way. Nonetheless, it is called “modified.” It was suggested by one interview respondent that perhaps the negative association of modifying food in describing GM food is partly responsible for the varying levels of non-acceptance. The designation “GM” probably had little negative impact in the imagery for Americans who 1) tend to embrace and expect change, 2) do not attach
cultural significance to food, and 3) largely trust governmental and market forces to protect them from harm. Conversely, this same nomenclature had the opposite effect on Koreans where form and emotive are active determinants of cultural acceptance. Thus a negative public image attached to GM in Korea because 1) “Modified is equivalent to artificial and unnatural,” 2) the government and the market are not trusted, and 3) there is great sensitivity to food as a core statement of value identifying the Korean culture, which is already a sensitive issue given the rapid changes in Korean society over the past fifty years.

In the interviews with both Korean and American scientists, scientists made it clear that they distinguish themselves from the producers, consumers, corporate and political interests surrounding the GM food debate. Scientists are largely very angry at the NGOs which they charge are “anti-scientific, antisocial and anti-democratic.” Scientists argue that the NGOs exploit the misunderstanding of the public where according to one American scientist, “They [NGOs] turn the findings of scientists against us.”

There are acceptable uses for GM food and genetic modification as described by this Korean respondent, “I like the idea of reviving the wild fox”--Korean housewife’s response when asked if there was anything redeeming about GM technology.” It seems clear from the interviews that food in particular was singled out as negatively related to GM. One previous study (Hallman, Jang, Hebbden & Shin, 2005) reinforces this point and states that the terminology “GM” was more often associated with crops in 31% of
Korean respondents compared with 7% of American respondents. However, Korean interviewees said even GM food is acceptable in some cases:

- “GM technology could be used to make food or other things ‘more Korean;’ ”
- “Korean traditional medicine could use GM to “recombine ginseng and gingko”, thus creating something more naturally healthy;
- “If GM food was used for helping sick or poor people who might need the GM; food to help cure their disease or to avoid some allergic reaction—this might be acceptable. But I don’t want to eat GM food everyday.”

Functional foods or health-related nutrition is thus an area where GM would be more accepted, such as in enhancing traditional Korean foods important in the food culture, with the caveat that this might be appealing “if it is all from Korean soil”. Yet, Korean respondents are still hesitant to accept GM food, again due to mistrust of the Korean governmental regulatory system, and the perceived risk implied in the nomenclature “modified.”

Another application of GM held in a positive light in Korea is in the area of biodiversity and the preservation of the natural climate. Korean scientists are not finding strong resistance to the idea of remediation of once polluted soils via vegetation that “eats” mercury, lead or other heavy metals. Another example is the re-introduction of the Wild Fox and White (Korean) Tiger species, now rare or extinct, through GM technology. Recent developments in cloning stem cells, a precursor for future therapeutic cloning,
and achievements such as cloning canine species, captures the imagination of Korean people.

The purpose of this study was to compare South Korea and the United States on the topic of acceptance of GM food and to attribute cultural explanations for acceptance of GM food among and between the two cultures.

South Koreans and Americans in the study converge on their positive opinion about the attributes of biotechnology generally, but have vastly different interpretations when it comes to food biotechnology. Koreans in this study on the whole were much more likely to reject GM food, even after extensive discussion about the risks and the technology itself. Americans were more likely to already accept GM food even after discussing possible risks. Americans perceived risks of GM food to be unwarranted because generally they trusted their institutions and their own experience (e.g., citing 10 years since widespread use of GM crops with no obvious side effects).

Most Americans we interviewed accepted GM food except in such cases where science, government or experience told them it was not safe. Americans according to the data were more willing to accept GM food due to 1) trust in their institutions deriving from a history of accountability and balance of power inherent in the U.S. political and market systems, 2) faith in science deriving from the centrality of efficiency in agriculture and the concurrent industrial revolution and blossoming of science and technology during the
19th and 20th centuries, 3) a short-term cultural orientation which places value on the present and future over past tradition and control over the future in decision making, 4) a food culture which places value on food predominantly in relationship to productivity (efficiency), and 5) individual rights and personal experience are more valued than group or social rights and responsibilities. Yet Americans might reject GM food under certain circumstances:

- If science or personal experience gave them evidence of harm;
- If [given awareness] unethical corporate motivations came to light;
- If [given awareness] an individual’s perceived right of choice was infringed.

Most Koreans we interviewed rejected GM food. Koreans according to the data were less willing to accept GM due to 1) caring and concern (feminine cultural traits) for the health of future generations, 2) higher threshold for acceptable risk and a higher degree of concern for avoiding uncertainty due to risk, 3) highly defined expectations for food traditions due in part to Long-term cultural orientation, 4) “Seniorship” or filial piety, expressed as a desire to protect and honor Korean farmers due to farming’s association with traditional Korean food culture, 5) low levels of trust in Korean regulatory institutions due to relatively new democratic systems of governance, 6) a high degree of trust in NGOs as politically responsive social affiliations and, 7) higher levels of trust in media as more reputable sources for information about GM foods. Yet, Koreans might accept GM food under certain circumstances:

- Where its safety could be 100% guaranteed;
- When the decision did not impact others’ consumption;
- When the cost of choosing GM was low;
- If they were living in America or otherwise without knowledge or choice;
- If when GM food served to reinforce Korean food culture.

In discussing cultural factors it is important to note the presence of a primitive-modern scale within the cultural domains identified above. Each interviewee assessed various aspects of their culture as falling along a scale. For example, Americans generally described themselves and GM food in positive terms with regard to science and technology, where Americans see themselves as taking the lead. In food culture, Koreans clearly placed themselves in a superior position to Americans whereby GM food detracted from a more advanced level of food culture.

Second, cultural factors in the data overlap and intersect such that the relevance of any factor’s impact on acceptance depends on the context or what Knorr-Cetina (1999) describes as the epistemological culture (knowledge system) in which GM food is discussed. For example, if GM food is discussed in terms of scientific knowledge of risk and benefit, it is more readily accepted by both cultures. However, if GM food is discussed in terms of long-term or short-term cultural orientation, or group verses individual orientation, GM is rejected by most Koreans and accepted by most Americans.
Third, the various cultural factors being described through the words of participants seem to display inclusion and exclusion rules; in other words, a set of cultural concepts acts as a gatekeeper for consideration for which to apply a particular context. For example, many Koreans said “GM food is not Jong.” Conceptual success (acceptance) or failure (rejection) according to the inclusion-exclusion rules operating within a particular aspect of culture, in this case Jong. In order for GM food to be Jong, it must possess purity. The cultural common sense asks the obvious question: How can anything modified be pure? On the this point, regarding the basic inclusion-exclusion decision as to whether GM food is Jong (accepted) or Hun (rejected), the interview data show that GM food was much more likely to be accepted when portrayed in terms of modern scientific culture. Both Koreans and Americans took pride in and perceived themselves and one another’s cultures to be modern. However, there was concern among the Koreans that Americans would not feel Korean society was modern if it rejected GM food. Rather, Koreans felt that American food culture was very “Hun” and displayed a lack of caring because not only do Americans eat alone, they feed their children fast food (The BM-Big Mac) and GM without hesitation. A second cultural context that resonates with Korean culture was if GM food was produced for pure and caring purposes e.g., to treat the ill. A third cultural context is the Korean’s willingness to accept GM food in high trust settings, for example Koreans living in America where trust in science and government is higher, and choice or knowledge over choice, is lower. At a minimum, there appear to be at least ideal cultural heuristics for acceptance
of GM food on each cultural factor to which GM food must conform (pass the test), and perhaps one or two that are critical in gaining acceptance.

A second salient finding that was not revealed by survey data on GM food acceptance was the occurrence of situated opinion—that is people’s values, interpretations of meaning, perceptions, and acceptance of GM food changes depending upon their current context and prevalent “cultural environment.” That is, in any given circumstance, people may be more or less willing to accept GM food either theoretically—agreeing that food biotechnology is good for the future, or behaviorally—purchasing or eating GM food, for Koreans for example, when it does not violate deeply held cultural affects—in this case, potentially cause harm to others. These contextual issues give added weight to the importance of “Heuristics,” or frames, which are useful in understanding the acceptance of GM foods. To illustrate, GM foods were introduced in the “Korean context” where 1. Trust in government is low but trust in media and NGOs is high, 2. Food culture is valued, 3. Group orientation is valued; 4. Risk tolerance is low, 5. Korean Farming, and therefore farm culture is valued because its role in food culture in reinforced by LTO and “seniorship”, and 6. Homogeneity is high, which leads to rapid diffusion of information.

A primary example of the power of a negative cultural heuristic is demonstrated by the feeling that Americans are exploiting weaker countries by experimenting on them with HIV drugs and GM foods, while the government is protecting Americans. Is this to be
explained culturally or, like GM food acceptance generally, as a lack of information (evidence of the facts)? Projecting the cultural values of Koreans such as suspicion of government’s motives (political and self-interested), the high importance of purity of intention (i.e., compassion for others’ health and well being), trust in media (believability of news reports), and the historical societal mental association Koreans have with developing or weaker states [Korea having recently experienced its own extreme poverty and continued food dependence], may lead to compassion for developing countries. Nevertheless, while Korea’s status as an advanced country may compel Korean people to feel the need to protect other developing nations from abuses of power. Yet they are culturally constrained in doing so by another strong cultural trait, deference to, in this case, the United States, for its advanced S&T and political and historical significance to Korea.

The sum of these frames, like a gestalt, gives rise to the Korean belief that America might be exploiting weaker societies. Perhaps the American cultural response would be to react indignantly to Korean charges of exploitation and counter that Koreans are ill-informed, lacking in evidence and not supporting their claims with facts. Americans see themselves as benevolent leaders in science and technology, adhering to rights, trusting of government to expose and punish wrongdoers and of the market to act in checks and balance according to its interests, and Americans assume that’s the way all people (including Koreans) think, or should think.
Cultural factors thus may serve as the equivalent of fatal flaws (for rejection) or turnkeys (for acceptance). The operant cultural factors represent lenses (filters) with which to view artifacts such as “GM food.” GM food must then adhere to cultural rules, assumptions of truth and values criteria, in order to pass as acceptable. This is a cultural process of signification that influences acceptance or rejection. As mentioned earlier in the literature, it could be speculated that science comes closest to an “etic” truth that might be ascribed to by many different cultures.
CHAPTER V
CONCLUSIONS

Results from this study illustrate the complexity of cultural differences in acceptance of GM food between Americans and Koreans. The survey research was useful in illustrating differences and alluding to reasons, while the qualitative research added depth and intricacy to understanding why there are cultural differences in acceptance of GM foods. The results derived from each methodology are valid within their own systems of knowing.

The current study’s findings show that cultural factors do impact perceptions of understanding GM food both indirectly and directly according to a “process of signification.” This process may be described as the constant production and re-production of meaning where an individual constantly and repeatedly interacts with an artifact such as GM food. This repeated interaction with GM food affects an individual’s thinking and behavior leading to contextual dominance of specific sub-cultures such as market, political, food, etc., as they interact with Hofstede’s definitions of culture which I will label “heuristic cultures” for analytic purposes and that include individual-group orientation, uncertainty avoidance, long-term or short-term orientation, and trust, etc. The nexus of the subcultures and heuristic cultures produces an interactive sum of which we see reported in the aggregate survey data focused at the national culture level.
The current research refocuses the questions about acceptance in the categorical, dichotomous outcome, toward what Knorr-Cetina describes as “systems of knowing” or epistemic cultures. Understanding cultural factors surrounding GM food acceptance is therefore, driven by cultural heuristics and sub-national cultural frameworks of expectations about the truth. It is not surprising to find that culture impacts opinions on GM food, because culture is omnipresent in every knowledge system. It is however surprising to find the scope and influence of cultural heuristics (individualism, trust, uncertainty avoidance, masculinity, power distance and long-term orientation) affecting national scientific, political, economic, and market sub-cultures.

Grounded theory’s intent is to describe relationships between conceptual categories that emerge, change or remain the same in describing the framework of issues relevant in GM food acceptance. Turning specifically to the current study’s relationship to extant literature and the data from the Korea-US comparative survey, the following concepts remain the same:

- Lack of scientific knowledge (deficit model) is too simplistic in ascribing reasons for acceptance and rejection of GM food;
- Food strongly sustains many national and ethnic cultures;
- Koreans were much more aware of GM food than Americans;
- Koreans were much more skeptical about GM food benefits;
- Americans were both more accepting and more unaware than Koreans about GM food as in previous studies;
Trust was a factor in previous studies and remained a core cultural trait in the current study for acceptance.

New concepts that emerged or concepts that changed include:

- GM food may be acceptable within the context of sub-cultures shared by each country, such as within scientific culture;
- Perceptions of risk are driven by perceptions of harm in both cultures; however, the question of to whom the risk accrues was a central factor in determining acceptance in the qualitative study;
- Koreans and Americans approached the issue of risk in similar (scientific) ways, leaning on evidence from trustworthy sources, yet Koreans’ threshold for acceptable risk was much higher than their American counterparts;
- American and Korean cultures share common beliefs in scientific culture and use these in coming to a decision on accepting or rejecting GM food;
- Americans and Koreans have the capacity to think in logical and evidence-based ways and do so in regard to making decisions about GM food;
- Koreans attach strong cultural significance to food itself and these values, especially when they coalesce with trust around negative media coverage, trump other strongly held values including scientific cultural values;
- Koreans are much more willing to accept GM food in terms of medical benefits;
- Koreans were more likely to accept GM food if it can be used to make things more Korean (e.g., traditionally Korean foods);
Koreans are more likely to accept GM food if purity of motives and caring could be used in the delivery of or production of GM food;

The market sub-culture’s effect on acceptance was a new factor in accounting for acceptance. In the U.S., the market sub-culture assumes that producers will not release products (such as GM food) if these will harm the public for fear of lost reputation and consumer confidence (i.e., sales), whereas Korean market culture assumes producers will release harmful food products given lax enforcement of consequences;

Koreans trust in the American system of food regulation;

Food culture in America is less traditional than in Korea and new food developments such as GM food lead to almost no reaction in the U.S., whereas food developments are highly sensitive issues in Korean culture;

One finding not addressed by survey research is “Culture as a process of signification” – or the constant production and re-production of meaning in an individual’s behavior and in a particular context-the sum of which within particular (national) boundaries-creates national culture;

Another new finding was that Koreans were potentially highly suspect of the motives of American food testing and regulation in other countries, especially developing countries;

Finally, Koreans tended to adopt cultural views similar to Americans while living in the United States about food and GM food, but given the choice, will avoid GM foods.
The current study is significant for many disciplines including the fields of science communication, science education, cultural anthropology, science and technology policy and international contexts—any fields which grapple with national and cultural differences impacting the growing scale and diffusion of science internationally and globalization of the scientific enterprise.

In an age of globalization characterized by increased scientific, economic and cultural information exchange, the scientific community, policymakers and science educators must more fully account for the impact of cultural perspectives on the scientific and research enterprise. Explaining differences of acceptance or rejection of biotechnologies across cultures is of interest because different nations have distinctly different perspectives on the benefits and needs for which these technologies were developed to address (Paarlberg, 2000). The borders between the laboratory and real life are becoming blurred (Knorr-Cetina, 1999). Increasing our understanding of cross-cultural research methodologies in the development of current science - such as genetically modified (GM) foods- is an increasingly important field of study given the escalating presence of science and technology on people’s lives.

Confidence in the scientific community is strong in the United States and has averaged 45% approval and trust from Americans over the past 10 years (NSF, 2004). Yet, the results of this study show how a single gauge of one country’s confidence in science is inadequate in consideration of the impact of varying levels of trust from other countries,
which may erode overall confidence in the global scientific enterprise. Moreover, failure to consider cultural factors may lead to lessened trust in U.S. scientific organizations as a whole as was evidenced in this study, where people in Korean society believed that American science and technology is “experimenting” with the health of people from developing countries.

Higher education is a major producer of scientific research. Therefore, the curricula of higher education administration in the U.S. should increase the international content of its courses, highlight the role of culture, foster international comparisons about the sociology of science and build rigor into research that stresses the importance and relativity of ethics and values. By developing new concentrations on cultural impacts on knowledge about science and technology, new bodies of research on social and strategic choices that influence knowledge production and innovation and their effects, educational administration as a field of study could take a leadership role in educating the public about the role and the products of science in society, creating a new cadre of administrators that can act as a communicators between science and societies globally.

This study provided a better understanding of cultural impacts on acceptance or rejection of GM foods and challenged professionals engaged in public understanding of science and technology to account more thoroughly for the influence of culture. The study also highlighted key cultural explanations comparing South Korea and the United States.
important to an informed debate about the methods of communicating new technological advances in science across cultures. Finally, the current study illustrates additional cultural dimensions worthy of further inquiry because they shed light on the sub-cultures and cultural heuristics outlined above.

In the pre-interview word association data on “nature,” it became clear that the inclusion of humans in the open-ended descriptions of nature had an impact on Koreans’ acceptance of GM foods (Chi Square significance .250). According to NSF surveys, seventy-five percent of Americans believe “nature is so complex, that it is impossible to predict what will happen with GM crops.” At the same time, four in five Americans “approve of GM to create more nutritious grain and three in four would approve of GM foods to create less expensive or better tasting foods” (Hallman, 2002). The bi-national survey completed in Korea and the United States has open-ended response data on thousands of subjects. Further investigation into whether this correlation strengthens in the aggregate would be interesting.

The percentage of the American public with an “undecided” opinion about the moral acceptance of genetically modified foods has grown since the first survey in 1998, suggesting that Americans are becoming more aware of the potential drawbacks (NSF, 2004). A sub-theme found in the interviews touched on the topic of religion and the moral status of GM foods. Generally, Koreans and Americans held somewhat different moral views on the question of acceptance. Koreans identified a hypothetical religious
reason in arguing for disclosure about GM. “Vegetarian or non-meat eating religious
can preclude eating a particular species of animal—but the genes targeted for a desired
characteristic derive from the animal species and might be placed in a tomato,” one
respondent offered as an example. She argued that people belonging to that set of
beliefs should know [through labeling] so that they can choose whether or not the
presence of that particular extracted gene means they can’t eat that tomato. One Korean
scientist in thinking about role of religion in science said, “I don’t believe in the theory
of evolution. I used to, because I believed in what the textbooks said-without applying
critical thinking.” He said it is hard to believe that our universe or life itself could have
been by accident or chance. He goes on to say “No one can prove that God does not
exist--it is harder to disprove the existence of God because this is spiritual and therefore
beyond natural processes.” One statement from a Korean scientist in particular captures
this interpretation:

    God’s characteristics are love, mercy and unbiased-ness. Thus God judges
without bias, like science, according to right and wrong in the strictest
interpretation. Scientific knowledge is derived through natural means, not
spiritual. We should take care not to destroy the natural order that God created.
We are endowed by our creator to emulate his wisdom and to exercise control
over nature in his good intents and purposes. God gave us the power of
innovation and creativity.
An American scientist, on the other hand, identified how “religious precepts get in the way of the practical aspects of modern life.” This view seems to sublimate religion to science, or at least to American pragmatism. The relationship between spirituality, religion and the role of science and food to each other may yield additional information with which to add more richness to the description of what factors influence acceptance of current science and technology.

Noelle-Neumann’s (1974) widely accepted Spiral of Silence theory holds that the fear of isolation and a desire to identify with the popular opinion can bolster support for the perceived majority stance on an issue, while “silencing” who believe their opinion may be in the minority. Whether this theory applies cross-culturally or is rather an American artifact in premise and in evidence would be an interesting topic for future research. In Korea, the appropriate theory might be termed “eruption of consensus.” New artifacts or issues quickly congeal in homogenous Korean society and where groups check the positions of groups and where there is deference to a hierarchy of group positions to which individual Koreans may remain silent in their opposition. Korean people appear from the study of the GM food issue, to check around them (media, family, friends) for other opinions, approvals and acceptances, then quickly close ranks. The Spiral might be very strong in Korea as one respondent put it, “Using media, anti-GM elements quickly captured the majority opinion ‘anti-GM’…It is not the fault of Korean culture, it is that we are manipulated by certain social or political groups.” Another respondent claimed,
“Koreans tend to keep their prejudices…[it is] very hard to change their minds once
decided…[it is] a very closed system.”

It is clear from this and previous studies that South Korea and the American media are
not representing the GM food issue the same. Another aspect of acceptance deserving
further attention and which is not covered in the interviews is the question of whether or
not the Korean media had access to or sought the opinions of scientists in Korea. Did the
Korean media face the same difficulties accessing the scientific community, leading to
negative reporting of information derived from the NGOs? What is the level of scientific
understanding among Korean media, especially the television broadcast media?

Acceptance of GM food should be studied in other cultural contexts extending
Hofstede’s framework to determine how and if cultural factors become salient or hold
across cultures or between new technologies that cross borders. Other controversial
biotechnologies (such as animal or human) should be examined within American and
other national cultures using the same framework. Therapeutic stem cell technology is
seemingly an opposite case in point, widely accepted in Korea, widely rejected in
America when compared to GM foods. As one respondent put it, “the public in Korea
has nothing cultural to lose, nothing economic to lose, in fact it (the successes of stem
cell cloning) can become a symbol of national pride… a rallying point for Korean global
recognition.” Further study of different technologies through the cultural lens deserves
more attention.
A final area for further investigation is how Hofstede’s work on what I call heuristic cultures might be used to understand scientific culture. The GM food option presented by technology and science is driven by the Western value system, including economic progress and growth. Behind the technological artifact (GM food technology) is a whole framework of cultural assumptions concerning capital, power, ideology, knowledge and morality (Hindmarsh, 2003). Is Western culture truly the culture of science, where science can thrive and finds ready adherents? How and in what ways can science thrive in Eastern cultures?
REFERENCES


APPENDIX A

CONSENT FORM

1. CULTURAL IMPACTS ON PUBLIC PERCEPTIONS OF BIOTECHNOLOGY: A COMPARISON BETWEEN SOUTH KOREA AND THE UNITED STATES

1. I understand the purpose of the study is to investigate the role of culture on my perception of Genetically Modified (GM) foods. I understand my participation in this study is voluntary and I may agree to accept $20 for each completed interview (available only to citizens of the U.S. or legal residents, foreign nationals must hold J1 or J2 or B1 or B2 visa with appropriate authorization).

2. I understand the study seeks to illustrate cultural differences found between Americans and South Koreans about GM foods. The study is designed to provide insights into the cultural dimensions of differences of opinion found between the two cultures, not to promote one culture’s viewpoint over the other.

3. I understand that I will be one of approximately twenty (20) participants both South Koreans and Americans who are affiliated with Texas A&M University. Balanced representation will be sought among participants according to gender, marital status, age, and family composition.

4. I understand I will be expected to participate in at least 2 individual interviews on two separate occasions over the course of the spring 2005 semester. Each interview will take approximately 1 hour. I understand that I will be asked to discuss my opinion only and there are no wrong answers.

5. I understand interviews will take place either on campus or at a mutually agreed upon location. The discussions will be audio recorded and transcribed. Interviews will be conducted in the native language of the respondent. I understand I will be given a copy of the transcripts and asked to clarify, review, delete or add information to the record. No personal information will appear in any results or reported findings.

6. I understand all transcripts or recordings will be kept confidential, and only the researcher (Richard Nader) Research Assistant, Dr. Yvonna S. Lincoln, other committee members and other participants may have access to research records.

7. I understand my participation is voluntary and that I may withdraw from the study at any time without explanation. Withdrawal will not result in any penalty or loss of benefits to which I am otherwise entitled.
8. I understand any questions may be directed to Richard Nader at Tel. 979-845-3099.

CULTURAL IMPACTS ON PUBLIC PERCEPTIONS OF BIOTECHNOLOGY:
A COMPARISON BETWEEN SOUTH KOREA AND THE UNITED STATES

CONSENT FORM

Please indicate your willingness to participate and acknowledge having read the information presented on page 1 by signing both page 2 and 3 of this form. Please keep page 2 for your records and return page 3 to:

Richard H. Nader,
Graduate Student, Education Administration Human Resources Department
c/o Mail Stop 3371 Fax 979-845-3085

"I understand that this research study has been reviewed and approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, I can contact the Institutional Review Board through Dr. Michael Buckley, Office of Research Compliance at (979) 458-4067."

"I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study. I have been given a copy of this consent form."

PRINT NAME:       Date

Richard Nader 979-845-3099       Date
APPENDIX B

INTERVIEW GUIDES

INTERVIEW A

1. What are 3-4 words you might use to describe Science?

2. What are 3-4 words you might use to describe biotechnology

3. What are major features one should know about South Korean/American culture?

4. What are 3-4 words you might use to describe American Culture?

5. What are 3-4 words you might use to describe South Korean Culture?

6. To your knowledge, have you ever eaten GM foods?

7. Do you think it is safe to eat GM Foods? Why (not)?

8. Why do you suppose other people might or might not want eat GM foods?

INTERVIEW B

I am going to show you some differences found in a comparative survey of GM foods conducted in South Korea and in the United States. The surveys were conducted in the U.S. by the Food Policy Institute at Rutgers and in South Korea by the Korea Research Institute on Bioscience and Biotechnology under contract with Gallup International. The same instruments were used in both countries.

1. After thinking about the results, why do you suppose these are different?

2. Of the following, which, if any do you think might affect a perception of GM foods?
   a. Responsibility to one’s family
   b. Willingness to accept authority
   c. Willingness to accept uncertainty
   d. Decisiveness and assertiveness
   e. Saving face
   f. Focus on the present over the past and future
   g. Importance of relationships compared to rules/law
   h. National pride (patriotism)
   i. Trust in institutions (government, media, NGO, etc.)
Culture: A pattern of thinking, feeling and acting (behaving) that is learned throughout a person’s life, beginning in early childhood, and whereby consistent patterns are evident and identifiable in topic specific opinions as adults. Meaning in interpretation is actuated through culture. Culture is a predisposition (tendency) to respond in a given way when presented a set of circumstances or conditions.

1. What is it you admire about your culture? What is problematic?

2. GM foods, what do you know about these, what have you heard?

3. How did you respond? Was it positive or negative?

4. Have you ever eaten GM food?

5. Do you believe that the individual is most responsible to him/herself in deciding to eat GM food or does one act in the interests of the group?

6. If an authority asserted that GM food was safe, would you question that assertion?

7. Where would you place yourself on a scale of 1-10, with 10 being a highly uncertain outcome for the safety of GM food?

8. If you believed GM food was risky, would you warn others?

9. Proponents of GM food often state that there have been no documented cases of health problems associated with GM food products such as the flavrsavr tomato. How much faith do you put in that finding?

10. How trustworthy do you feel your society’s institutional actors (e.g., government, industry, media, NGOs, scientific community, doctors, farm groups, etc.) are, especially when it comes to GM food regulation?

INTERVIEW D

1. Do you believe in the theory of evolution?

2. Do you believe in God?

3. Tell me what you believe God’s characteristics to be?
4. Do you think humans (mankind) can prove or disprove the existence of God through science?

5. Do you agree with the following statements? Why?
   a. What is true and who is right is MORE IMPORTANT than what succeeds.
   b. Science explains nature BETTER than religion.

6. Which of the following statements do you find more accurately reflects your beliefs?
   a. Nature is sacred because God created it
   b. Nature is sacred in and of itself
   c. Nature is important, but not sacred

7. Agree or Disagree? Why?
   a. Recombinant DNA technology, which makes GM food possible is just plain wrong.

INTERVIEW E

1. What is it you admire about your culture? Problematic
2. GM foods, what do you know about these, what have you heard?
3. Have you ever eaten GM food?
4. Agree or Disagree that Recombinant DNA technology, which makes GM food possible is just wrong. Why?
5. Do you believe in the theory of evolution?
6. Do you believe in God?
7. Tell me what you believe God’s characteristics to be?
8. Do you think humans (mankind) can prove or disprove the existence of God through science?
9. Do you agree with the following statements? Why?
   a. What is true and who is right is MORE IMPORTANT than what succeeds.
   b. Science explains nature BETTER than religion.
10. Which of the following statements do you find more accurately reflects your beliefs?
    a. Nature is sacred because God created it
    b. Nature is sacred in and of itself
    c. Nature is important, but not sacred
VITA

Richard H. Nader
B.A. English, 1986, Sam Houston State University
Master’s in Public Administration, 1989, Texas A&M University

Director, China Initiatives
Look College of Engineering, Texas A&M University

2005-2007, Visiting Scientist, Program Director, East Asia Pacific Division, Office of International Science and Engineering, National Science Foundation

1999-2005, Instructor, School of Rural Public Health, teaching Proposal Writing

Nader was responsible for setting the overall direction for academic and research exchange for Asia and the Pacific Rim at Texas A&M University as director of the Institute for Pacific Asia from 2000-2005. Now on leave of absence to NSF since August 2005, Nader is responsible for China programming for the Look College of Engineering at Texas A&M University. His research interests include science and technology policies and higher education systems in Asia, for which he was awarded a Jordan Institute Fellowship in 1999. Nader’s dissertation research examined cultural factors impacting perceptions of genetically modified foods between South Korea and the United States. Nader served as Principal Investigator of a major bilateral effort between Chinese and U.S. universities regarding management of university intellectual property, technology transfer and commercialization funded by the U.S. Department of State. He served as Principal Investigator for several NSF supported exchanges between China, Japan and the U.S. promoting public understanding of science through media and museums. Nader’s research experience includes policy analysis, program evaluation, archival data analysis, and survey research. Qualitative methods experience includes focused interview, grounded theory interviewing, case study, and content analysis, with special emphasis in research design in cross-cultural contexts. Nader has published on the topic of higher education reform in Japan, cultural impacts on current science and technology and university collaboration in community service. Nader was founding director of the Center for Community Support, a university-based community development program and was responsible for over $12 million in competitive projects being awarded to Texas community-based organizations over 5 years. The Center received the “Innovations in American Government Award” from Harvard University as a Top Program for its work with community-based organizations in 2000.