ABSTRACT

FULKERSON, GREGORY. Reality and Representations: How Americans Think about Agriculture. (Under the direction of Ronald C. Wimberley).

The purpose of this dissertation is to identify representations of agriculture in America and to develop models that predict the different representations. It is concluded that social representation theory—as it has been formalized here—is useful for explaining how Americans think about agriculture, particularly alternative representations of structure and technology. While past research on attitudes and paradigms has emphasized that personal characteristics and socioeconomic status are important predictors, this research finds that they play less of a role when controlling for variables operationalizing the propositions of social representation theory—trust of networks, personal perceptions, and pre-existing ideas. Future research should incorporate additional sets of questions operationalizing other pre-existing ideas such as the way Americans think about economic efficiency and productivity as well as science and technology, as these may improve the explanatory power of the conventional representations models. Finally, a disparity between representations and reality is argued to exist that makes the current state of agricultural policy unrepresentative and therefore undemocratic.

REALITY AND REPRESENTATIONS: HOW AMERICANS THINK ABOUT AGRICULTURE

by
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BIOGRAPHY

I was born January 25, 1975 in Chicago, Illinois, to my parents Bud and Sandy Fulkerson. In my younger years my family moved around, and I enjoyed life in the rural areas of both Kansas and Pennsylvania. I always loved playing in the woods or feeding the three cows that would visit me in my backyard. These early days instilled in me a love for life in rural America and a sense of wonder about farming.

Later, my family moved to Ann Arbor, Michigan where I spent the remainder of my youth. After high school, I moved to East Lansing, Michigan to begin my studies at Michigan State University. It was there that I became interested in sociology and especially with environmental and agricultural issues. In my time in East Lansing I learned many important lessons in life that would help me to succeed.

My master's program was carried out at Western Michigan University, in Kalamazoo, under the guidance of Gregory J. Howard. Together, we had many wonderful discussions with each other and with the other graduate students whom I miss greatly. It was there hat I continued to expand my interests in environmental issues, working with Dr. Howard.

After the completion of my master's program, I moved back to Lansing to teach. At Lansing Community College I learned the art and science of teaching and gained a greater appreciation for those who had taught me along the way. The people at LCC were very helpful and afforded me several opportunities to enhance my teaching abilities. But after a couple of years I decided that I missed the research component of sociology, and applied to North Carolina State University for the Ph.D. program.

At North Carolina State University I was early paired with Professor Ronald Wimberley. We discovered that we shared many of the same interests in terms of environment, agriculture, rurality, and social change. As his research assistant, I learned much of what I know today about how to do research—many lessons of which were taught purely by example. It is exciting for me to be finishing this program on a project that involves Dr. Wimberley every step of the way.

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Next I would like to thank my chair, Dr. Ronald Wimberley, for providing me years of guidance and encouragement. He allowed me access to the data that was truly a privilege to analyze. Also, many thanks go to Dr. Robert Moxley, who taught me about community, development, and social change. He has broadened my sociological imagination by introducing me to many new theoretical ideas. I have also truly enjoyed the times we have spent talking informally in his office. Finally, thanks to Dr. William Clifford and to Dr. Jack Thigpen for serving on my committee, reading many early and late drafts of the proposal and dissertation, and for your helpful comments and discussions. Without your input, this dissertation would not be possible.

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CHAPTER 1

INTRODUCTION TO THE REALITY AND REPRESENTATION OF AGRICULTURE

When Columbus suggested the world was round, he was ridiculed because everyone knew the world was flat. When Galileo espoused the Copernican view that the planets revolved around the sun, he was nearly put to death for heresy. In both cases, reality was not accurately represented by society. And, in both cases, society fiercely resisted making changes to its representations in spite of the fact that most people had neither seen the planet from space nor adequately studied astronomy to make an informed guess about planetary behavior. Instead, thoughts about these subjects were informed by pre-existing religious and mythological ideas. While these observations are now trivial and society is now aware that we live on a round planet that orbits the sun, the same type of social process can arise in other domains.

A unique advantage of the sociological perspective is that it helps one to identify disparities between reality and representations. One ground-breaking sociologist, W.I. Thomas, highlighted the importance of this in a single proposition stating, that which we define as real will be real in its consequences. Although the belief in a flat earth was not accurate, it successfully prevented people from sailing off into the horizon for fear of falling off the planet's edge. When the representation of a round earth came to replace the flat earth representation, an era of exploration and colonization followed that transformed the world as we know it. These examples show that the disparity between reality and representations can be significant, lasting, and consequential.

Investigating the reality and representations of agriculture is the focus of this dissertation. In the United States, representations of agriculture have fewer bases in personal perceptions of objective conditions than at any other time in history, as fewer people farm or know farmers. Rather, most people form their ideas based on how they think about related issues, and on the kinds of social groups to which they belong and with which they exchange ideas. As W.I. Thomas reminds us, the consequences of these representations will be real in terms of guiding both consumer behavior and citizen action.

Reality and Representations

There has been an agricultural transition sweeping across the world that started centuries ago, began more recently in the United States, and continues to unfold in new ways. This involves changes in the structure of agriculture, from a large number of small to medium sized farms to a small number of large farms, a growing number of which are corporate, non-family operations. It also entails changes related to technology. As fewer people are available to farm the same amount of land—as a result of the changing structure—more sophisticated technology is required as a replacement for human labor. In turn, mechanical, chemical, biological, and other technological changes have led to a need for fewer people to farm. Hence, changes in the structure and technology of agriculture are the central components of the agricultural transition.

One way to assess the overall impact of the agricultural transition is in terms of sustainability. While the sustainability concept has been used in different ways, it is used here to refer to the economic, environmental, health, and community dimensions. Many scholars in rural sociology and the sociology of agriculture perceive the transition to be

on an unsustainable path, and have created a vast literature exploring this reality. Another branch of literature focuses on the agricultural attitudes of individuals in society or the agricultural paradigms of groups directly involved. Both of these branches are concerned with reconciling the disparity between the alternative agrarian and sustainability values of the American public with the reality of policy and consumption patterns that add fuel to the agricultural transition.

In this dissertation I intend to build on and add to these literatures by bringing in the theory and concept of agricultural representations. The hope is that this will aid in the explanation of both individual attitudes and group paradigms, while adding a higher level of abstraction and theoretical depth. A founder of sociology, the French sociologist Émile Durkheim, maintained that the main object of sociological investigations ought to be representations found as social facts in society. However, surprisingly few studies have actually incorporated this concept.

I intend first to explore how different ideas about the structure and technology of agriculture have formed as agricultural representations in America. Next, I will attempt to determine why individuals align themselves with the particular representations, as they are found in society. To meet these objectives empirically I will rely on two representative national surveys of adults in the United States from 1992 and 2001. Using these data, I will attempt to identify the social representations of agriculture through exploratory factor analysis. Following this I will attempt to model individual support through both ordinary least squares regression and structural equation modeling. In developing an explanatory model, I will test hypotheses based on propositions derived

from social representation theory, as well as those offered through the literature on agricultural attitudes and paradigms.

I will conclude this dissertation with a discussion that considers both the theoretical and policy implications of agricultural representations, and how they are related to the reality of the agricultural transition. In the end, representations will continue to shape the future of agriculture regardless of how closely they approximate reality.

CHAPTER 2

THE REALITY OF THE AGRICULTURAL TRANSITION

Some of the most significant social changes in human history have revolved around the agricultural transition (Lobao and Meyer 2001; Paarlberg 1986; Wimberley 1986). This process began hundreds of years ago in Europe, when sociology was just a fledgling idea, so it is not surprising that the earliest sociologists were mostly preoccupied with its consequences. Marx focused on the implications it had for transforming class relations. Tönnies focused on how it was altering the nature of social interaction from natural to rational will, and from gemeinschaft to gesellschaft. Durkheim analyzed the religious, political, legal, and moral implications of the transition, and how these were related to the emerging division of labor and shift from mechanical to organic solidarity.

In the United States the transition happened much later than in Europe. In 1900, one in every three Americans claimed to be a farmer. Today that number has been reduced to one in 50, as shown in Figure 2-1. Nevertheless, 90 percent of American farms remain classified as individual or family run. But as Table 1-1 illustrates, most farmers do not rely solely on farming to survive: 90 percent of their income is from off-farm sources. This can be contrasted with both 1950, when average off-farm income was only 30 percent, and 1970 when the majority of farmer's incomes shifted to off-farm sources. In the United States, farming has come to be viewed as a secondary job, a pastime, or even a hobby. As Figure 2-2 illustrates, there are few places left where

people claim to be full-time farmers. Nevertheless, many places still rely on the agriculture industry for their livelihoods (Lobao and Meyer 2004).

[Insert Figure 2-1]

[Insert Table 1-1]

[Insert Figure 2-2]

Contemporary sociologists continue to struggle with understanding the reality of the agricultural transition. Buttel's (2003) discussion of "seven discontinuities" is a good overview of many current issues. In this discussion, he identifies the emergence of long-distance global food commodity chains, the spread of global neoliberalization, the increased level of differentiation in the structure of agriculture, the industrialization of livestock production, new agricultural technologies, the relocation of agrarian protest outside of mainstream agriculture, and the environmentalization of agriculture. Out of these issues, I would argue that the two most socially transformative have been changes in the structure and technology of agriculture. However, these profoundly influence and are influenced by cultural ideas about neoliberalism, agrarianism, environmentalism, and political ideology.

Changes in the Structure of Agriculture

One component of the agricultural transition is the switch from a system that is based on a large number of small predominantly family farms to one that is based on a smaller number of large and, more frequently, corporate farms. Table 2-2 shows that, since 1910, the number of farms has decreased by two-thirds, while average farm size has tripled. The total acreage of land devoted to farming has undergone a curvilinear path,

but the land is now shared by one third as many farms as was the case in 1910. This reflects a general trend toward consolidation.

[Insert table 2-2]

Land consolidation in farming can be attributed to a number of causes, not the least of which is the exodus of individuals and families who no longer find farming profitable. At the same time, many people see an economic opportunity in selling their farms, as the average value of farms is much higher than the national average of homes in the U.S. (Lobao and Meyer 2004). In fact, Lobao and Meyer (2001) claim that the value of farmland, buildings, and other physical capital has increased four times during the past century even controlling for inflation.

Perhaps even more striking than land consolidation is the trend toward the concentration of sales among the largest farms. In 2002, small farms—as measured by annual gross farm-product sales under $50,000—made up about three-quarters of all farms, but only 6.2 percent of sales (Census of Agriculture 2002). In contrast, large farms—as measured by gross annual farm-product sales of half a million dollars or more—made up about 3.5 percent of farms, but accounted for more than 50 percent of all sales. This clearly represents an uneven distribution. In sum, most farms are small to medium-sized and are family owned and operated. However, most farm-product sales are accounted for by a small number of large farms that may be either family or corporately owned.

Changes in the Technology of Agriculture

The second component of the agricultural transition is technological change, characterized by a shift from labor-intensive to capital-intensive methods. There have

been three major revolutions associated with mechanical, chemical, and biological technologies.

In terms of machinery, the 1920s marked the introduction of the first practical gasoline powered tractors to farming. Prior to that, farmers relied mainly on horses and mules to supplement human labor. In 1959, the number of tractors used on American farms surpassed the number of horses and mules, signifying the beginning of the modern farm, as shown in Table 2-3. Along with tractors came a host of other machinery used for planting and harvesting crops, or for growing livestock.

[Insert Table 2-3]

Shortly after these mechanical breakthroughs became part of the conventional lexicon of American agriculture, there was a shift in focus to chemical technologies as a means to achieving greater productivity (NASS, USDA 1997a). This is evidenced by the skyrocketing use of pesticides as shown in Table 2-4. Total pesticide use, while not following a linear path increased 273 percent between 1964 and 1997. Within the different kinds of pesticides, herbicides have accounted for most of the increase since 1976, while insecticide use has actually declined by roughly one half, due in part to pest-resistant Genetically Modified Organisms (GMOs). Roughly 40 percent of pesticide use was for application in corn production in 1997. Other crops that are pesticide-intensive include soybeans, wheat, cotton, and potatoes. In the seven year period between 1991 and 1997 alone, expenditures on pesticides increased from $6.3 billion to $8.8 billion (NASS, USDA 1997).

[Insert Table 2-4]

The third technological revolution in farming is associated with biology. At the recent forefront of this are GMOs. In one sense, as McHughen (2000) claims, people have been consuming GMOs for nearly 40,000 years through the use of different breeding techniques. However, the use of transgenic or recombinant DNA technology—splicing, cloning, and connecting DNA—is a revolutionary new way to achieve the same ends as breeding.

There has been a flourishing of GMOs in the United States. McHughen (2000: 2) observes that the U.S. has approved 44 GMOs, including "12 corn (maize), 7 canola (rapeseed), 6 tomato, 5 cotton, 4 potato, 3 soya bean, 2 sugar beet, 2 squash, and 1 each of radish, papaya, and linseed flax." These same crops have traditionally relied on heavy chemical inputs, so genetic modification promises a way to reverse this pattern. For example, Monsanto's Round-Up Ready cotton will resist the active ingredient in Round-Up, glyphosate, thereby increasing the effectiveness of the pesticide and the output of cotton (McHughen 2000). In turn, farmers who buy Monsanto seeds will achieve higher productivity if they also buy Monsanto pesticides.

While genetic modification is a new and contentious issue, a number of other biological technologies have emerged in livestock production. For example, many operations have come to rely upon the use of antibiotics as these prevent the spread of communicable diseases. As with crop agriculture, livestock operations have grown large and consolidated and, as a result, livestock holdings put as much livestock as together as possible in the least amount of space. An unintended byproduct of this is that the incidence of illnesses becomes more frequent. This, in turn, can lead to a reduction in productivity to the point at which livestock operators begin to lose the advantages they

gained from economies of scale in the first place. Thus, antibiotics are viewed as important to maintaining productivity in highly consolidated livestock operations.

In addition to maintaining productivity through antibiotics, is the desire to boost productivity through the use of hormones. The faster animals grow to size, and the larger they end up being, the better the return on the investment. Hormones are a viable way to achieve both of these ends. In sum, both hormones and antibiotics represent some of the latest biological technologies available for livestock production.

Finally, there is another class of technology that is important to mention, and it involves the use of nuclear science. In specific, the use of food irradiation has become a conventional practice, as it combats food borne diseases that can have detrimental effects on human health. In this way, radiation is similar to the use of food preservatives in terms of prolonging the freshness of food.

The Sustainability of Conventional Structure and Technology

Changes in the structure and technology of agriculture have successfully increased efficiency and productivity in agriculture to a point that was heretofore unthinkable. Yet, these changes have also introduced a variety of unintended risks to the sustainability of agriculture and food (Wimberley 1987). Sustainability is a multidimensional term (Gale and Cordray 1994) and can be considered in terms of economic, environmental, health, and community dimensions.

The Economic Dimension of Sustainability

In general, the evidence supports the idea that changes in agriculture have led to an increase in productivity, as measured by the ratio of economic inputs to outputs, as

shown in Table 2-5. The ratio of outputs to inputs at mid-century started out at about 1:2 (0.5), and steadily increased to over a 1:1 (1.0) ratio by 1985, marking a dramatic improvement.

[Insert Table 2-5]

This improvement in productivity has both created and resulted from the need to maintain profitability in the context of lower food prices. Table 2-6 shows that the ratio of prices received to prices paid has been shrinking in exactly the opposite direction of productivity. Until 1950, every dollar spent by farmers to produce goods resulted in a payment of somewhere between 80 cents to a little over a dollar. Hence, farming never proved to have a very wide margin of profit from a strictly economic point of view. In the period between 1960 and 1997, this ratio declined to half the pre-1950 levels. Now, for every dollar paid, there is an average return of less than 50 cents. This of course is an average, as larger farms—that make up a minority of all farms—experience a much better rate of return than do small farms.

[Insert Table 2-6]

At this stage, it is important to briefly consider the political context. The 1996 "Freedom to Farm" Bill removed agricultural commodity price floors, leading to a dramatic drop in prices. In turn, agri-businesses benefited greatly, as they were able to engage in a "buying bonanza" (Lobao and Meyer 2004). Simply put, the cheaper these businesses could buy commodity inputs, the higher could be their total profits. Further, this could be accomplished while actually *lowering* the prices that consumers pay for food at the cash register.

Consumers have therefore benefited from gains in productivity in terms of spending a smaller slice of their income—roughly 10 percent—on food (Table 2-7). By comparison, during the Great Depression Americans were spending roughly a quarter of their total disposable incomes on food. However, as should be clear from the discussion above, money spent on food products should not mistakenly be thought of as money going directly to farmers as most goes to the distribution and value-added processing captured by agri-businesses.

[Insert Table 2-7]

Achievements in productivity are the main reason why food prices have become so low, as they have created a larger supply. In order to achieve profitability—or a price index greater than 1—farmers must adopt the most advanced innovations and use large-scale operations to maximize efficiency through economies of scale. Otherwise, they risk losing their livelihoods. Most small-scale farmers cannot afford to make these investments and are faced with the dilemma of either ceasing to farm or continuing with a money-losing venture. Most small farmers have failed to keep up with productivity demands and choose to leave farming. Even large farms that are finding it difficult to make a profit are coming to rely more heavily than ever upon subsidies. Ikerd (2002) summarizes what this means for businesses, farmers, and consumers:

> Americans spend a little more than ten-percent of their disposable income for food – a dime of each dollar. Equally important, less than a penny of each dime they spend goes to the farmer who produces the food – eight cents goes for packaging, transportation, advertising and other marketing services, and more than a penny goes for purchased inputs. If farmers received nothing, food prices could only be ten percent lower at retail, and if the farmers received twice as much, food prices would need only be ten percent higher.

In sum, productivity gains have hurt farmers but have benefited both consumers and agri-businesses. But this arrangement may not be sustainable without heavy reliance on government subsidies.

The Environmental Dimension of Sustainability

The relationship between the structure of agriculture and environmental quality is not entirely clear. Heffernan and Green (1986) provide an overview of the literature on this relationship, and state that the consensus view is that increasing consolidation has had a negative impact, mainly because large farms are more capital intensive. Furthermore, the literature supports the idea that smaller farms are better at protecting the environment because the decision-making process remains local, and people do not generally want to foul up their own backyards. However, in their own research, Heffernan and Green find that large farms were less likely to experience soil loss than were small farms. They attribute this to the fact that small farms were typically located on more marginal soil to begin with, and were thus predisposed to greater soil loss.

The impact of new agricultural technologies on environmental quality has been more direct than that of structural changes. On one hand, the use of pesticides has led to many benefits in terms of higher yields, greater efficiency, and growing profits as discussed earlier. At the same time, the economic benefits of pesticides may be outweighed if the environmental costs were not treated as externalities. One of the pioneering scientists to raise awareness about the harmful environmental consequences of conventional pesticides was the biochemist Rachel Carson. In Carson's (1962:18) critique of pesticide use, she asks, "Can anyone believe it is possible to lay down such a barrage of poisons on the surface of the earth without making it unfit for all life?" She

pointed out one of the central problems is the application of a wide range of non-species specific chemicals at every stage of agricultural production. These chemicals end up in surface and ground water, and accumulate in wildlife through the process of bioaccumulation. One of the main perpetrators that Carson condemned was DDT, and her book alone helped contribute to the end of its use in American agriculture.

The environmental impact of genetically modified food is a relatively new issue that has yet to be fully explored. What is known is the potential for GMOs to breed with other species in nature, permanently altering the natural gene pool of organisms. For instance, one particular variety of rapeseed (Canola) has been found to be vulnerable to cross breeding with other natural species in adjacent fields (McHughen 2000). One of the resulting fears is that this may create a super-weed that is resistant to conventional herbicides, and could lead to catastrophic losses in production in the future.

The Health Dimension of Sustainability

In addition to the risks posed by the use of various chemicals in crop agriculture, the use of hormones and antibiotics in livestock agriculture also carry a number of potential health risks. According to Diaz (2002), a study conducted by a panel of scientists from the European Union reveals that hormones in livestock production can lead to myriad health problems including cancer. Women, in particular, are susceptible to this as the animal hormones disrupt natural hormone production.

Next, the use of antibiotics is thought by at least one organization, the Union of Concerned Scientists (2006), to lead indirectly to diminished health. This is because the overuse of antibiotics decreases their effectiveness over time. For example, antibiotics for tuberculosis or influenza are becoming less effective for humans as these diseases are

growing resistant from antibiotics administered to livestock. In other words, the diseases evolve to be resistant in animal livestock, but as a result of the new resistance, the antibiotics are less effective for people. In turn, diseases such as these can see a possible resurgence in the future causing a public health crisis.

The Community Dimension of Sustainability

The impact of the changing structure of agriculture on communities has mainly been felt in rural areas across America, and has received a great deal of attention from rural sociologists. The classic study is Goldschmidt's (1978 [1947]) analysis of two communities in California, Arvin and Dinuba. In Arvin where large corporate farming operations were predominant, the quality of life was on the decline. In Dinuba where smaller family farms were prevalent, the quality of life was stable and strong. Quality of life is indicated by the number of wage laborers versus entrepreneurs, living conditions, population stability, physical appearance, religious institutions, level of community loyalty, type of community decision-making, level of segregation, level of retail trade, and the quality of schools, parks, and social services. Goldschmidt's conclusions have led to a number of further studies.

Moxley (1986) offers one review of the Goldschmidt hypothesis literature. He finds that in the 1980s, several studies challenged Goldschmidt's initial conclusions. For example, Harris and Gilbert (1982) found large-scale farms were positively associated with the quality of life; Swanson (1982) found no negative relationship between scale and quality of life; and Reif (Lobao 1986) found large family farm structure to be positively related with income/employment, but that corporate farms had a negative relationship. Based on these studies, Moxley suggests that a community with a moderate number of

family farms of medium size is ideal. He also concludes that the Goldschmidt hypothesis had initial support, but that the evidence points to a curvilinear relationship between scale and quality-of-life. Farms that are too small fail to provide an adequate living, while farms that are too large are typically absentee owned, corporate-controlled, and have worse working conditions.

Lobao (1990) offers another review of Goldschmidt studies between 1972 and 1985 and finds that of 18 studies, nine showed supportive results, seven had mixed results, and two did not support the hypothesis. Hence, on balance, there is slightly more quantitative support for the hypothesis than against it. However, she agrees with Wimberley (1987) on the point that it is still unclear as to whether farm size or farm structure—i.e., corporate or family ownership—is the relevant mechanism.

For his analysis of U.S. Census data, Wimberley (1987) identifies three dimensions of agricultural structure, or agristructure. He observes that the majority of studies testing the Goldschmidt hypothesis assume that agristructure is a single dimension, and therefore allow the notions of large size and non-family, corporate structure to be interchangeable. Wimberley concludes that the relationship between agristructure and social well-being will remain inconclusive until the multidimensionality of agristructure is appreciated and measured more precisely.

According to Lyson (2004), the negative impact of farming on communities is mainly due to the location of the decision-making apparatus. If it is located internal to the community where economic and non-economic networks are intertwined, there is an inherent desire to maintain and improve community well-being. If it is located outside of the community—as is the case with absentee-owned farms—then the welfare of the

community can easily become secondary. This is because external actors, whom are not embedded in the community, have a singular interest in maximizing profits. As the agri-food system continues to its course of global integration, this phenomenon is exacerbated.

Summary of the Sustainability of Structural and Technological Changes

In reviewing the sustainability of agriculture, the story is mixed. On one hand, productivity is higher than has ever been the case with fewer inputs required to achieve greater output. The price of food has remained very low as a result, allowing consumers the luxury of spending a small fraction of their incomes to keep themselves fed. Moreover, the agricultural industry as a whole has flourished even if this has not been true for many individual farmers. On the other hand, gains in productivity have meant the sacrifice of farming as an occupation. Large, capital-intensive corporate farms are favored in a competitive playing field requiring economies of scale and large capital investments. A recent study of the USDA, by Hoppe and Banker (2006), shows overwhelming support for this claim.

A long research tradition has shown that communities dominated by large corporate farms typically experience a lower quality-of-life on a number of indicators, as compared to those hosting more family operations. Though receiving less empirical attention from rural sociologists, the environmental consequences of the agricultural transition have been shown by other scientists to contribute to soil loss, soil and water contamination, the loss of biodiversity, and genetic modifications among naturally occurring species. Moreover, there are a number of unknown human health risks associated with eating foods that are genetically modified or have had different chemical or biological treatments.

The Alternative to Conventional Agriculture

Because of the many unintended consequences of the agricultural transition, many people have begun turning to food that is grown using alternative technologies and an alternative structure. Unlike conventional agriculture, the litmus test of alternative agriculture is that food be grown with community, social (i.e., health), and environmental sustainability foremost in mind (Wimberley 1993). In other words, economic gains in the form of efficiency, output, and profits are no longer allowed an overriding status. Furthermore, alternative agriculturalists tend to emphasize the view that the economic viability of farmers is a separate issue than that of the economic viability of the agri-food industry.

Among the many different terms associated with alternative agriculture, Beus and Dunlap (1990) identify organic farming, regenerative agriculture, ecoagriculture, permaculture, bio-dynamics, agroecology, natural faming, and low-input agriculture. Most of these refer to specific methods employed, and therefore are more concerned with alternative technology than alternative structure. However, in a discussion of alternative structure, Lyson (2004) emphasizes the importance of making agriculture more civic. Lyson maintains that civic agriculture is based on the idea that food should be grown and consumed in the same locales wherever possible, by small to medium sized family farms, with the well-being of the community as the central guideline. Specifically, Lyson (2004: 85) states that there are six characteristics of civic agriculture:

(1) "Farming is oriented toward local markets that serve local consumers rather than national or international mass markets

(2) Agriculture is seen as an integral part of rural communities, not merely as production of commodities

(3) Farmers are concerned more with high quality and value-added products and less with quantity (yield) and least-cost production practices.

(4) Production at the farm level is often more labor-intensive and land-intensive and less capital-intensive and land-extensive. Farm enterprises tend to be considerably smaller in scale and scope than industrial producers.

(5) Producers more often rely on local, site-specific knowledge and less on a uniform set of "best management practices."

(6) Producers forge direct market links to consumers rather than indirect links through middlemen (wholesalers, brokers, processors, etc.)"

In terms of specific practices, Lyson (2004) conceives of civic agriculture as including farmer's markets, organic farmers, small wineries, community kitchens, community gardens, small-scale food processors, community-supported agriculture, and farms selling directly to the public.

Other practices characterizing the alternative agri-food system include urban gardens, community land trusts, food policy councils, college-level educational farms, food cooperatives, cooperative agricultural marketing programs, producer and consumer cooperatives, direct marketing, labeling, eco-labeling, alternative knowledge networks, and farm stands (Allen 2004). Each of these channels provides an alternative to traditional distribution through grocery stores, restaurants, and supermarkets. In addition, they bring ordinary people into closer contact with the system of food production, under the assumption that greater contact will result in more informed choices.

From a strictly economic standpoint, alternative agriculture does not pose a significant threat to the conventional system. Some alternative technologies are even being incorporated into the conventional agri-food system as illustrated by the growth in the organic foods section in grocery stores. In any case, giving people the choice between

conventional and alternative food enables them to support the system they would like to see succeed. By purchasing foods grown with alternative structures and technologies, people are directly reversing—or at least slowing—the agricultural transition. The remaining question is why do people choose to support alternative versus conventional structure and technology? That is the central question guiding the research that follows.

CHAPTER 3

THE EMPIRICAL AND THEORETICAL BASES OF REPRESENTATIONS

As the previous chapter discussed, crop and livestock agriculture in the United States are being fundamentally transformed by an increasingly large, corporate structure and by the introduction of new technologies (Paarlberg 1986; Wimberley 1986; Olson and Lyson 1995; Lobao and Meyer 2001). Despite gains in economic productivity and efficiency, this transformation has introduced a number of risks for the social (health), community, and environmental sustainability of agriculture (Heffernan and Green 1986; Wimberley 1993; Beus 1995; Schwarzweller and Lyson 1995; Allen 2004).

Because few people are personally involved in agriculture, most are unable to see this transformation for themselves. About this situation, Paarlberg (1986:12) claims, "The important thing for an observer is to look at what happens rather than listen to what is said. If one should listen instead of look, his mental images of agriculture might be out of date." Wimberley (2002: 2) agrees: "Indeed, it is the look versus the listen that reveals underlying transformations in agriculture and, in many cases, changes being experienced by rural areas." The unfortunate reality is that the non-agricultural majority lacks the ability to look at what is happening, so they must listen.

As listeners, people sort through information that is passed on to them by others and attempt to make sense of the underlying reality. Without personal experience as a baseline, many people will be reluctant to form opinions and become indecisive or apathetic (Lyson 1986). Others will form opinions that are consistent with how they think and feel about social, environmental, agrarian, economic, and political issues.

Regardless of how closely they approximate reality, the representations of agriculture held by the non-agricultural listeners will guide consumer and citizen behavior. As consumers, when people purchase food or clothing they indirectly support the system that created the materials for these products. As citizens, when people vote for political representatives or specific policies, they influence the direction of agriculture (Wimberley 2002). Since agricultural representations will influence these actions, it is crucial to examine how the non-agricultural listeners form them and to pay attention to the contents of these representations at the individual, group, and collective levels at different point of time.

Rural sociologists have provided a valuable service by describing the attitudes held by the non-agricultural listeners at different point in time (Wimberley, Harris, Tomazic and Katz 2002). They have also described the paradigms of agricultural groups that are able to look first-hand at the effects of agricultural transformation (Beus and Dunlap 1991, 1992). These include farmers, agricultural organization members, university faculty, and social movement participants (Beus and Dunlap 1991, 1992; Jackson-Smith and Buttel 2003).

A key component that is missing in the literature is an explanation of how the non-agricultural listeners form shared representations at the national level. Since attitudes are individually held, and paradigms are held by those directly involved, a new concept is needed to examine shared representations of agriculture. In this dissertation, I will attempt to provide this missing piece by building on the existing literature and by testing hypotheses derived from social representation theory. Before discussing this

theory, a review of the aforementioned literature on agricultural attitudes and paradigms will provide a necessary conceptual and empirical foundation.

Past Research: Attitudes and Paradigms

Agricultural Attitudes

The first literature upon which this project builds is the study of agricultural attitudes, as this describes the images that individuals have of agriculture. In particular, these studies examine attitudes about the role of government (Wimberley, Thompson, and Lobao 2002), environmental impacts (Hoban and Clifford 1994; Thigpen 1994; Harris and Bailey 2002), food safety (Tomazic, Katz, and Harris 2002), drinking water safety (Tomazic and Katz 2002), pesticide use (Molner, Traxler, and Harris 2002), farm animal welfare (Ohlendorf, Jenkins, and Tomazic 2002), and agrarianism (Coughenor and Swanson 2002).

Role of government. Wimberley, Thompson, and Lobao (2002) examine public attitudes about the role of government in agriculture. They show that, in general, the public is undecided and somewhat apathetic about the government's role. Between 1986 and 1992, there was increasing disagreement with the idea that farmers should compete in a free market. There was growing agreement that farmers receive too much money from government. There was continued agreement with the idea that policies have helped consumers and not hurt farmers. And there was strong support for both small and family-owned and operated farms, while there was significantly less support for both large and corporate, non-family farms. Between 1986 and 1992, levels of support increased for small and family farms and decreased further for large and corporate farms.

Animal welfare. In another study, Ohlendorf et al. (2002) examine public attitudes of farm animal welfare. They report that the majority of U.S. residents feel that human rights are more important than animal rights, while a sizeable minority—one-fifth—feel that human rights are not more important. Ohlendorf and colleagues suggest that this is indicative of a general western anthropocentric moral and ethical system. In addition, they find that concern for animal welfare is split along the lines of gender, age, race, income, residence, farm experience, political ideology, and region of the country.

Environmental impact. Another set of studies examine public concern over the environmental impact of agriculture. Harris and Bailey (2002) find that, while concern is expressed, only a quarter of the public view agriculture as a major source of pollution. Consistent with this, Tomazic and Katz (2002) report that the public is less concerned about the environmental impact of extractive and agricultural industries on water quality, when compared to the impact of traditional manufacturing or hazardous and solid waste landfills. Specifically, they find that hazardous waste siting, factories, solid waste landfills, mining activities, and timber harvesting were rated as bigger threats than crop farming or animal production. Hoban and Clifford (1994) observe that people are generally most concerned about their health when they express negative attitudes about the impact of farming on water quality.

In terms of soil quality, Harris and Bailey (2002) note that most people, while generally supportive of farmers, do not trust them to be good environmental stewards. Thigpen (1994) shows from a historical perspective that public concern over the impact of farming on soil quality has fluctuated. The first widespread concern followed the Dust

Bowl, and later reemerged in the 1960s with the modern environmental movement. Trust in farmers as environmental stewards may have been compromised at these important points of time.

Ironically, Harris and Bailey (2002) maintain that most people do not blame farmers or government for the negative environmental outcomes of agriculture. Instead, people look to the chemical companies that produce pesticides and fertilizers, and to consumers who benefit from the use of these technologies because they make food cheaper. Thus the public view is that if farmers are not good stewards, it is because they are in a position whereby they are forced to use unsafe methods to be competitive. In turn, most Americans express a willingness to pay more for food produced without the use of chemicals.

Food safety. Related to the environmental impact of agriculture, is the issue of food safety. In a study of attitudes about food safety, Molnar, Traxler, and Harris (2002) draw from the perspective of risk analysis and conclude that there is a general uneasiness about the use of pesticides in the U.S. They state that the main connection people make is the risk that pesticides pose to human health, particularly those that are the most severe and rare as opposed to those that are common and less severe.

Given the public uneasiness of pesticide use, it is not surprising to find that Tomazic, Katz, and Harris (2002) report public perceptions of organic food to be highly favorable. They also note that food treated with radiation or nitrates elicits the worst public response. Tomazic et al. (2002) construct an overall food safety index, in order to examine social differences in attitudes. They find that women are less likely than men to perceive food as safe. Racial and ethnic minorities are less likely than Euro-Americans

to view food as safe. Political liberals are less likely than moderates or conservatives to see food as safe. They show that there is more concern about food safety among non-farming respondents. And finally, they show that more highly educated and the highest income earning individuals are the most likely to view food as safe.

Agrarianism. A final study, by Coughenor and Swanson (2002), delves into the analysis of agrarian ideology in the United States. The authors conceive of agrarianism as consisting of four categories of beliefs: agrarian fundamentalism, agriculture as a natural way-of-life, yeomanship, and family farms. These categories emerge as dimensions in a factor analysis, suggesting that agrarianism is in fact not a single ideology. Traditionally, agrarianism flourished with ideas of progress, industrialization, and enterprise. But recent challenges to the capacity of farmers and small farms to be good stewards and husbands of the land have produced different varieties of agrarianism. A large proportion of Americans share agrarian fundamentalist values, in terms of seeing agriculture as having a basic and important place in society.

Conclusion. These studies describe what people in the United States think about agriculture from a variety of perspectives. They show, for example, that Americans are supportive of small and family farmers, while pointing a finger at larger corporate farms and chemical companies for most problems in agriculture. While Americans feel that government should help small and family farms, they feel that past involvement has been inadequate. Further, these studies show that agriculture is perceived to be a threat to the environment, although not as big a threat as other industries. A slight majority feel that food grown using conventional methods is safe, but most say they would be willing to

pay more for food grown without the use of chemicals. A final interesting theme to note throughout these analyses is that a sizable proportion—usually around one-third—is typically undecided about these matters.

Agricultural Paradigms

The second body of literature that this project builds on is that of agricultural paradigms. Agricultural paradigms are fundamental belief systems about the way agriculture works, how it fits in society, and how it affects the environment. They are held by groups that have carefully considered the philosophical implications of opposing positions. Because of the high level of abstraction involved, agricultural paradigms exist in groups that are directly involved in agriculture. In other words, unlike public attitudes, agricultural paradigms form in groups of people who can look at agricultural transformation first-hand.

Roots of the debate. Beus and Dunlap (1990) were the first to systematically outline the debate between alternative and conventional agriculturalists as outlined in Table 3-1. They base their typological comparison on ideas that were gleaned from the writings of leading proponents of each paradigm. The conventional proponents they identify are Earl Butz, Marion Clawson, Hiram Drache, Earl Hedy, Wheeler McMillen, and U.S. Representative Jamie L. Whitten. On the alternative side, they identify William Aiken, Wendell Berry, C. Dean Freudenberger, Wes Jackson, Gene Logsdon, and Robert Rodale.

[Insert Table 3-1]

Generally speaking, conventional agriculturalists are supportive of the agricultural transition. They favor a highly centralized structure and reliance on high-input technology to maximize output and efficiency. Alternative agriculturalists oppose the agricultural transition, and prefer a decentralized structure with the use of techniques that are independent of high-input technology. In accordance, conventional agriculturalists emphasize the need for economic competition, specialization, and scientific research and development, while alternative agriculturalists emphasize crop diversity and the importance of community and ecological sustainability.

Based on this typology, Beus and Dunlap (1991) construct the Alternative-Conventional Agricultural Paradigm Scale (ACAP), a questionnaire with 24 forced choice items, shown in Table 3-2. For example, in the left column, the first statement is, "Meeting U.S. food needs with fewer and fewer farmers is a positive outcome of technological progress," whereas in the right column the statement is, "Meeting U.S. food needs with fewer and fewer farmers is a negative outcome of our free market system." An individual must choose the statement with which they feel they most identify. A score of one or two indicates adherence to the first statement, a score of four or five indicates adherence to the second statement, and a three indicates a neutral position between these two items. This is used to determine whether or not an individual adheres to the conventional or alternative agricultural paradigm.

[Insert Table 3-2]

ACAP studies. Beus and Dunlap (1991) administered the ACAP to a sample of Washington farmers, a sample of known members of conventional and alternative

agricultural organizations, and to the agricultural faculty at Washington State University (Beus and Dunlap 1992). In reviewing studies based on these data, Beus (1995) summarizes the findings. First, he states that young people were predicted to score higher on the ACAP, based on previous research. However, this was not the case in the sample of agricultural organization members, as the relationship was not significant. In the sample of farmers there was, surprisingly, a positive relationship between age and the ACAP. Second, and in terms of gender, Beus (1995: 38-39) claims that because women are generally stronger advocates of "environmental protection, appropriate technology, risk avoidance, and other issues closely related to the alternative agriculture paradigm," so that on average their ACAP scores were predicted to be higher. Support was found for this hypothesis.

Next, Beus (1995) states that because education is typically associated with environmental concern that ACAP scores were predicted to increase with education. Once again, the results were contrary to the predicted outcome. In the farmer survey, the less educated farmers scored higher. For the agricultural organization member survey, there was no statistically significant relationship. With respect to political ideology, Beus observed a positive and significant relationship between political liberalism and the alternative paradigm, and a positive and significant relationship between political conservatism and the conventional paradigm.

In another study, Beus and Dunlap (1994b) examine the relationship between agrarian ideology and the ACAP. Unlike previous studies, for this analysis the ACAP is divided into five subscales that are correlated with five subscales of agrarian ideology. The overall correlation between the ACAP and agrarianism is moderate and statistically

significant, but the magnitude is not as great as some of the correlations found between the subscales of each. For example, the economics and production sub-scale of agrarianism has a higher correlation with the ecological subscale of the ACAP. Beus and Dunlap (1994b) conclude from this study that both alternative and conventional agriculturalists are agrarian, in terms of viewing agriculture as fundamental, but they differ in the importance they place on efficiency and productivity.

Next, Beus and Dunlap (1994a) find that the ACAP successfully predicted farmer behaviors, measured by pesticide use, selection of a fertilizer source, growing a home garden, and farm diversity. Jackson-Smith and Buttel (2003) more recently replicated this study, but with a somewhat different questionnaire containing selected items from the ACAP in addition to some original questions. They similarly measure farmer behaviors by pesticide and fertilizer use, but add genetically modified seed use. In examining the responses of Wisconsin farmers, Jackson-Smith and Buttel (2003) find that there are only three discernible dimensions. The first two are family-farmism and environmentalism. These correspond to the ecological and social-structural dimensions identified by Beus and Dunlap (1994b). The third is more of a residual that they label lifestyle, but nevertheless has some resemblance to the way-of-life dimension identified by Beus and Dunlap (1994b). In turn, they find that two subscales of the ACAP achieve greater predictive power than the overall scale. In addition, the combined effect of subscales on farmer behaviors was inconsistent, suggesting that although the subscale dimensions are interrelated, they have different effects.

Conclusion. The literature on agricultural paradigms moves beyond analyses of individual attitudes by focusing on underlying ideas about how agriculture works. The

alternative-conventional paradigm debate is mainly carried out between groups that Jackson-Smith and Buttel (2003) refer to as the agricultural intelligentsia, which include policy-makers, organization leaders, and university faculty. These individuals and groups can look first-hand at agricultural change, and compare what they see to what they hear from others. For the general public—the listeners—the level of thought is not as thorough, and more people are undecided as was illustrated in the review of the literature on agricultural attitudes. In any case, the literature on agricultural paradigms is informative in terms of highlighting the key areas of the alternative-conventional debate, as may be found in the larger society.

The Social Representation Approach

Building on the foundation of agricultural attitude and paradigm research, this project uses the concept and theory of social representations. Attitude research describes the dispositions that individuals hold towards agriculture; paradigm research examines how specialized groups think about agriculture; but how do average Americans think about agriculture? The answer to this question requires a new approach and conceptual basis.

Classical Background

Social representation theory owes its origin to Émile Durkheim (2001 [1912]: 18), who was the first to discuss the idea of collective representations. In his analysis, he states,

> Collective representations are the product of a vast cooperative effort that extends not only through space but over time; their creation has involved a multitude of different minds associating, mingling, combining their ideas and feelings—the accumulation of generations of experience and knowledge.

In Durkheim's view, individual attitudes never exactly match those of the collectivity, but the combination of past and present individual representations, *sui generis*, are what constitute the collective representation. Because of their cumulative nature, collective representations cannot be reduced entirely to the individual level. Durkheim (1982 [1895]: 131) states that, "Collective representations, emotions and tendencies have not as their causes certain states of consciousness in individuals, but the conditions under which the body social as a whole exists." As such, collective representations are truly sociological.

Another classical theory to which social representation theory is indebted is symbolic interactionism. In outlining this classical theory, Mead (1934) explains how both individual thought and action result from social interaction, rather than internal instincts as was the dominant explanation of his time (Hewitt 1997). As people are born into and live in groups throughout their lives, the ways they think, see, and act are products of interaction within social groups. Mead suggests that people experience both "self in society" and "society in self." This basic theme is carried on by social representation theory.

Related Theories

Public image. There are a number of theories that are similar to social representation theory. For instance, Boulding's (1956) discussion of the public image is similar to Durkheim's discussion of collective representations. Boulding states that public images form from individuals communicating images of the world with one another that originally come from unique experiences and observations. Boulding notes

the social pressure to conform to the public image, but at the same time asserts that individuals who challenge it are the "true entrepreneurs" of social change. He offers the examples of Einstein and Marx on one hand, and Napoleon and Hitler on the other. These individuals had ideas of the world that differed from the public image, and had extraordinary influence, for better or worse. In Boulding's view, individual images that do not conform to the public image—mutated images—are the basis of all social change.

Frame theory. Another similar theory is frame theory. Frame theory was first introduced by Erving Goffman (1974), who defines frames as, "schemata of interpretation" that allow individuals to interpret and make sense of social change, which in turn influence and guide their actions. Frame theory has become a pillar in the social movement literature, as is shown in a review by Benford and Snow (2000). Benford and Snow (2000: 628) claim that frames are "continuously being constituted, contested, reproduced, transformed, and/or replaced during the course of social movement activity." Like social representations, Benford (1987, 1993) states that frames emphasize the social processes related to the construction of meaning. However, the emphasis is on the outcome of this meaning, in terms of mobilizing people and resources to create change. Thus, frame theory is better-suited to the study of social movements.

Sensemaking theory. Still another closely related theory is sensemaking theory. According to Fiss and Hirsch (2005: 30), while the framing perspective focuses on macro "processes by which actors produce frames of meaning to mobilize support for their respective positions," sensemaking refers to micro "social psychological and epistemological processes by which actors form an understanding of the situations they

find themselves in." Fiss and Hirsch state that integrating these perspective yields the combined processes of environmental cues and competing frames of meaning. In other words, the social process of framing can be integrated with the social psychological process of sensemaking. I would argue that social representation theory captures both the social and social psychological processes involved in this proposed integration, and therefore, social representation theory is more encompassing.

Contemporary Theory of Social Representations

The key figure in contemporary social representation theory is Serge Moscovici. Building on Durkheim's ideas, Moscovici (1988:220) defines social representations as "networks of interacting concepts and images whose contents evolve continuously over time and space." According to Farr (1993), "Moscovici first began to develop the notion of a social representation as a consequence of a correspondence in which he was engaged with Louis Guttman concerning the nature of scaling (personal communication)." In this manner, Moscovici combined the Durkheimian notion of collective representations with Guttman's logic of scaling to develop social representation theory.

Moscovici claims that there are three types of social representations. One is the hegemonic representation that is synonymous with Durkheim's notion. The second is the emancipated representation that emerges when groups create alternative representations. The third is the polemical representation that refers to the coexistence of opposing representations at the supra-group level. A crucial point Mosovici makes is that social representations do not necessarily imply consensus, as appears to be the case with Durkheim's approach.

Articulating the theory further, Doise (1993) asserts that there are three kinds of communication processes involved. The first, diffusion, involves information that is processed by groups and individuals without resistance because the information is compatible with pre-existing ideas. In hegemonic or collective representations, new information is spread in this way. The second communication process, propagation, involves the accommodation of new information from contradictory doctrines. This information may at first appear to challenge the existing social representation, but through propagation, it is made to be consistent. The third communication process, propaganda, is the rejection of novel information from contradictory doctrines. In this case, if it does not fit with what is known, then it not accepted as real.

Mechanisms. One of the key questions when examining any theory is to ask what mechanisms drive the theory. The mechanism leading to the formation of collective representations that Durkheim identifies is the motivation of individuals to conform to social expectations. Durkheim asserts that the failure of an individual to conform to collective representations can render them sub-human in the eyes of society. Individuals that challenge tradition, myth, religion, and science—the sources of the ideas that go into representations—endure harsh social reactions such as exile. Like Durkheim, Boulding (1956: 73) suggest that most people choose to conform because of "the extremely low value we place on exclusion and loneliness."

Moscovici (1988: 234) offers a different mechanism, claiming "all representations arise from our need to turn the strange into something familiar." In other words, people find disorder unsettling and have an inherent drive to fit unfamiliar information and ideas into pre-existing representations. This process is known as anchoring (Billig 1993).

Representations take on a reality of their own because they provide individuals and groups with a definition of a situation, and allow for the coordination of communication and action (Billig 1993).

Formalizing the Theory

The advances in social representation theory made by Moscovici and associates are remarkable. However, the style in which they present their arguments is discursive, and the pattern theory nature makes hypothesis testing difficult. Hence, in order to identify hypotheses it is necessary to first isolate the central propositions using more formal conventions. Prior to outlining these formal propositions, I offer a visual map— Figure 3-1— as a way to articulate more explicitly how information flows in social representation theory. This figure is only meant to be illustrative, and is therefore a parsimonious way to show the process involved with one social representation. There are three levels associated with the individual, group, and supra-group, and corresponding to these are attitudes, paradigms, and social representations, respectively. Attitudes refer to the disposition that individuals have towards some object, person, or idea. Paradigms refer to a fundamental model for understanding reality (Babbie 1986; Kuhn 1996[1962]). Social representations are similar to paradigms in terms of being models of reality, but can differ in that they exist across different groups over a period of time.

[Insert Figure 3-1 here]

The starting point in Figure 3-1 is arbitrary because the theory suggests that information and influence flow in both directions, from the individual, to the group, to the supra-group level, and back again. If one were to start at the bottom, it could be observed that personal perception is a way by which individuals become exposed to new

information. Before having an effect on their personal attitudes, however, this information is considered in light of pre-existing ideas. In this manner, attitudes can be changed on the basis of personal perception without the need for further communication with others. Aside from personal perception, individuals are also exposed to new information through communication networks with trusted sources. Indeed, with respect to agriculture, this is more the norm than the exception, as few people have the opportunity for personal perception. Again, this information is considered against the backdrop of pre-existing ideas before having an effect on the individual's attitudes.

Moving up the diagram, the arrows indicate that individual attitudes are passed on through communication networks within groups. Like the individual, the group filters information through pre-existing ideas before having an effect on the paradigm. It should be noted that the group paradigm may not match any one individual's attitudes perfectly, as it has emergent properties.

Next, as with individual attitudes, group paradigms are passed on to the supra-group level through communication networks, where social representations exist. These result from the interaction of both individual attitudes and group paradigms that are evaluated collectively against pre-existing ideas before having an effect. In turn, social representations are passed back through communication networks to the different groups and individuals. Hence, this process specifies how individuals both shape and are shaped by societal thinking.

Throughout the process are the moderating effects of trust in the communication networks. At the group level, some individuals have a high level of trust within the group, while others do not. The same is true at the supra-group level, where different

individuals and groups adopt or reject information based on determination of trustworthiness.

Figure 3-2 further illustrates the process in the form of one possible hypothetical configuration. As noted earlier, information can flow both ways so that social representations can shape individual attitudes and group paradigms, while individual attitudes and group paradigms can in turn alter, replace, or create a competing social representation. In Durkheim's model, however—the hegemonic social representation—the diagram in Figure 3-2 would be re-drawn without the group paradigm nodes, and there would be a single social representation rather than two.

[Insert Figure 3-2 here]

Individuals in Figure 3-2 are embedded in social groups, some of whom belong to more than one group, and some of who have greater influence in shaping reality at the group and supra-group levels. In this configuration, both individual attitudes and group paradigms contribute to the social representations. These in turn have a reciprocal influence on everyone. Also some individuals can have both direct and indirect network ties to other individuals and groups because of the way in which personal relationships and social group memberships overlap.

Finally, because social representations are cumulative, they survive long after the individuals and groups that construct them have passed. This can be seen in the continuation of Marxism long after Marx's death, for instance. The current social representation of Marxism continues to change as individuals contribute new information. Unlike Durkheimian theory—which only remains a paradigm among social scientists—Marxism became a social representation in many societies around the world,

and was used to shape national political and economic policies. This underscores the fact that social representations are much more than the sum total of individual attitudes.

Another example that illustrates how group paradigms and social representations interact is global warming. In constructing a social representation of global warming, scientific paradigms have come into conflict with the paradigms of political groups. Scientists suggest that certain industrial activities such as manufacturing are emitting greenhouse gasses into the atmosphere causing the planet's temperature to rise. Political groups contend that the scientific paradigm of global warming is not supported by enough evidence to warrant a definitive conclusion, and charge that global warming is therefore a mask for a hidden political agenda. The exchange between scientific and political group paradigms have led to opposing social representations of global warming, whereby some view it as a scientific fact and others see it as an a-scientific political agenda. Individuals in society who stand outside of these groups adopt attitudes based on their pre-existing ideas, such as their political ideology. If they are more conservative, they will tend to believe the political paradigm of global warming rather than the scientific paradigm.

Formal Propositions

As stated previously, the pattern theory nature of social representation theory does not provide readily testable propositions. In fact, Breakwell (1993) claims that most researchers using the social representation approach have done so with the goal of description, and have been resistant formalizing the theory. However, I am attempting to formalize social representation theory so that it may be tested as an explanatory theory of agricultural thought.

Therefore, based on the preceding discussion, an on my reading and interpretation of Moscovici, three fundamental propositions can be expressed. First, as Figure 3-1 illustrates, trust in communication networks is critical to the flow of information between actors and across levels. This can be expressed as the first proposition:

> **Proposition 1.** Communication networks must be trusted in order for information to have an effect on the individual attitude, group paradigm, or social representation.

Next, and in addition to gaining information from trusted sources, an individual's personal perception can have a direct influence on the way that individual's attitudes are formed. This can be expressed as the second proposition:

> **Proposition 2.** Individual attitudes can be affected by the individual's own personal perceptions of reality.

Finally, another important aspect of social representations is the ideological context within which they evolve. Multitudes of pre-existing ideas can influence how society will process new information, and this can be expressed as a third proposition:

> **Proposition 3.** Attitudes, paradigms, and social representations are directly influenced by pre-existing ideas at the individual, group, and supra-group level.

CHAPTER 4

PREDICTING SUPPORT FOR AGRICULTURAL REPRESENTATIONS

Having provided the conceptual background for this study, the discussion will now turn to an outline of the empirical contribution. To begin I will extend to the study of agriculture the formal theoretical propositions outlined in the previous chapter. Next I will state specific hypotheses derived from this extension. Following that, I will discuss the two national datasets from 1992 and 2001 that will be the basis of this analysis. Last, I will provide an overview of the specific methods to be used.

Extension of Propositions to Agricultural Representations

The previous chapter concluded with three key propositions of social representation theory. Here, I will extend these propositions to apply more directly to agricultural representations. To begin, Proposition 1—referring to trust of communication networks—can be extended to fit the analysis of agricultural representations by considering the different sources of information. Conventional agriculture—characterized by a large, corporate structure and high-input technology—has traditionally been tied to business, government, and university resources and actors (Beus and Dunlap 1992; Reisner 2003). Therefore, when an individual, group, or society as a whole trusts these different actors as sources of information, they should be more conventional in their views. The corollary to this is that when actors do not trust these information sources, they should have more alternative views.

Proposition 2—referring to personal perceptions—can be extended to the study of agricultural social representations by considering those who are directly involved in

farming, those who regularly communicate with farmers, and those who can physically see farming being done. Past research on attitudes has shown that people who lack the perspective of direct personal perception—those with a higher social distance from agriculture (Wachenheim and Rathge 2002)f—are more concerned about the environmental impacts of conventional technology and less concerned about the well-being of small and family farmers (Lyson 1986; Tomazic et al. 2002; Sharp and Tucker 2005). Given this, personal perception should increase support for alternative structure and decrease support for conventional structure. Meanwhile, personal perception should increase support for conventional technology and decrease support for alternative technology.

Finally, Proposition 3—referring to pre-existing ideas—can be extended by considering some of the most relevant types of pre-existing ideas. For this it is useful to consider the contributions of the agricultural paradigm literature discussed earlier. This literature identified as relevant political ideology, agrarianism, environmental concerns, and health concerns. These ideas tend to either bolster or challenge conventional or alternative views of agriculture. Hence, the way people think about this set of ideas should bear heavily on the way they think about agriculture. I will now elaborate on how each particular ideology relates to agricultural representations.

Political ideology. Political ideology has been shown through past research to be one of the most consistent predictors of agricultural attitudes and paradigms. Research has suggested that being politically liberal is positively related to food safety concerns (Tomazic et al. 2002), clean drinking water concerns (Tomazic and Katz 2002), and, more generally, to support for the alternative agricultural paradigm (Beus 1995).

Therefore, those who are politically liberal should also favor alternative agricultural technology over conventional technology, in addition to favoring alternative agricultural structure over conventional structure.

Agrarian fundamentalism. Agrarian fundamentalism is based on the way people feel about the importance of agriculture to society as a whole, in terms of being an occupation, a land use, and a way of life (Beus and Dunlap 1994b; Coughenor and Swanson 2002). Viewing agriculture as an important occupation should lead individuals to support alternative agriculture, as this involves the preservation of family farms, and opposition to conventional structure, as it has reduced the number of people employed in agriculture. Viewing agriculture as an important land use should lead individuals to support alternative technology as opposed to conventional technology, as conventional practices threaten land preservation. In addition, because conventional structure has led to the consolidation of farm land, those who view farming as an important land use should favor alternative agricultural structure and oppose conventional structure.

Environmental concern. Agricultural paradigm research suggests that alternative agriculturalists are more concerned about environmental issues. Other research has shown a negative relationship between attitudes toward structure and environmental concern (Sharp and Tucker 2005). In turn, environmental concerns should be related to support for both alternative structure and alternative technology, and opposed to conventional technology and structure.

Health concern. Finally, health concerns have been shown to be related to support for alternative technology in agriculture (Hoban and Clifford 1994; Molnar et al.

2002), while the relationship to attitudes about structure is less clear. It could be argued that people concerned about the health impact of farming have more confidence in conventional structure as opposed to alternative structure, as it is easier to regulate a few large farms than it is to regulate many small farms. Central ownership therefore may be viewed as being better for health. Conversely, to the extent that large farms use more conventional technologies, such as pesticides, people may view large farms as being worse for the environment.

Hypotheses

The first set of hypotheses is derived from the extension of Propositions 1-3, above, and is summarized in Table 4-1. Note that each specific hypothesis in this table identifies the particular proposition from which it was drawn in the rationale column. In some cases, there is also some existing empirical evidence supporting the hypothesis. The remaining hypotheses in this study—also in Table 4-1—are borrowed directly from past research on attitudes and paradigms. These hypotheses were not originally formulated with social representation theory in mind, but a connection can be forged, as gender, age, race, education, income, socioeconomic status, and region of the country all play a role in defining the types of groups to which people belong. Since group membership is central to social representation theory, these variables should shape exposure, acceptance, and use of social representations (Breakwell 1993). I will now elaborate on how these particular characteristics should be related to agricultural thought.

[Insert Table 4-1]

Gender. Past research on gender suggests that women are more likely than men to view food as unsafe (Tomazic et al. 2002), to have concerns about clean drinking water

(Tomazic and Katz 2002), and to have alternative agricultural paradigms (Beus 1995). As a result, as shown in Table 4-1, being female should be related to support for both alternative structure and alternative technology, and opposition to both conventional structure and conventional technology.

Race. Past research on race suggests that nonwhites are more likely than whites to view food as unsafe (Tomazic et al. 2002). There is no difference in concern about the safety of drinking water (Tomazic and Katz 2002). Neither is there a clear relationship between race and alternative or conventional paradigms (Beus 1995). As a result, nonwhites should be more favorable to alternative technology than whites, and more opposed to conventional technology, as shown in Table 4-1.

Age. Next, age has been observed to have a positive relationship with the alternative paradigm in past research on farmers (Beus 1995), and a positive relationship with food safety concerns (Tomazic et al. 2002), but no clear relationship with concern for the safety of drinking water (Tomazic and Katz 2002). As a result, as illustrated in Table 4-1, age should be related to support for alternative technology and alternative structure. This hypothesis, it should be noted, is based on past findings and not on what one might expect to find, and may be time sensitive with generational effects. Beus (1995) notes, it was predicted that younger people would be more supportive of alternative technologies, as a function of being more environmentally concerned. It could be the case that older people, who are more likely to have grown up on a farm or to have at least known farmers in the past, are more agrarian and thus more supportive of alternative structure than are younger people. This would lead to age having a positive

effect on alternative structure views and a negative effect on alternative technology views.

Socioeconomic Status. The next two variables in Table 4-1 deal with socioeconomic status. In the past, education has been shown to have a negative relationship with both concern for food safety (Tomazic et al 2002) and the alternative paradigm (Beus 1995). Income has been shown to have a similar effect on agricultural thought as education. Prior research suggests that there is a negative relationship between income and food safety concerns (Tomazic et al. 2002), but no clear relationship with drinking water concerns or the alternative paradigm.

Region. Finally, the relationship between regions of the country and agricultural thought is not known. However, this is an important control variable since different regions of the country are marked by different experiences with the structure and technology of agriculture. As chapter 2 showed, the Midwest retains a stronger alternative structure than the rest of the country. Meanwhile, the Northeast is highly urbanized and the furthest removed from farming. As Table 4-1 indicates, there is no specific direction predicted by region, only that there will be a regional difference.

Data

Following Dillman's Total Design Method, two questionnaires, one in 1992 and one in 2001, were mailed to non-institutionalized adults aged 18 and older. These questionnaires were part of the S246 and S276 United States Department of Agriculture and Land-Grant University multi-state regional projects. In both questionnaires, respondents were asked a series of questions about agriculture, food, and the

environment. Some items were not repeated verbatim on both questionnaires, and the organization, such as the order of items and arrangement of question sets, had slight differences. These differences should help provide greater validity to the findings in terms of reducing the effects of order and question sets.

The 1992 data are from the S246 survey questionnaire, "Food, Farming, and the Environment." The initial mailing of the questionnaire, cover letter, and return envelope was in February 1992. Ten days later a reminder postcard was sent, and soon followed by another questionnaire. The third questionnaire was mailed approximately one month later. The final response rate adjusted for non-deliverables was 37 percent with 2,866 usable questionnaires. The 2001 data are from the S276 questionnaire, "Food from Our Changing World: What Do You Think?" The first wave was mailed in late June 2001. The second was mailed in August 2001 and followed a reminder postcard. The third wave was sent in November 2001. By January 2002, there were 819 usable questionnaires, with a final response rate adjusted for non-deliverables of 20 percent.

Because of low response rates, particularly for the 2001 survey, the data were weighted by age, race, sex, education, and income. The 1992 data were also weighted by population in states, and the 2001 data were weighted by population in Census regions. The 1992 data were weighted by 1990 U.S. Census parameters and the 2001 data were weighted by the 2000 Census parameters. The proximity in time between the surveys and the Census periods enhances the validity of the weights.

The weighted sample statistics compare across the two surveys, with other Census parameters, and also with items from other national surveys conducted during the same time periods. The weighting procedures and close comparisons with other national

statistics and parameters provide a justification for using the 1992 and 2001 datasets. Even if the descriptive representativeness of each dataset is questioned, the data at least provide explanatory insight into the relationships between variables for the respective samples. Further details about the data, the weighting procedures, and comparisons with other surveys are provided in Appendix 1, and the questionnaire items are reproduced in Appendix 2.

Methods

The dependent variables for this analysis are agricultural representations. Social representation research evaluates how individuals share similar views (Billig 1993; Breakwell and Canter 1993), so the first crucial stage is to identify how individual attitudes hang together. Because structure and technology are so important to the agricultural transition, items that reflect the way people think about these key issues will be the main focus.

Social representation theory is not wedded to any particular kind of method. As mentioned earlier, Moscovici saw a theory embedded in the Guttman scaling technique, making this a relevant method. In spite of this, Farr (1993) reviews how social representations have also been measured in analyses of the media, analyses using indices with Likert-type items, and in qualitative analyses of discourse. The method depends largely on the type of data and measures that are available, as well as the orientation of the researcher.

The use of exploratory factor analysis is one practical way to proceed with Likert-type items. Factor analysis dimensions are, by definition, the commonly shared attitudes of individuals, and these dimensions literally indicate the similarities individuals have in

their patterns of responses to questions. As a result, factor analytic dimensions of agricultural attitudes can be viewed as practical indicators of social representations.

In considering possible outcomes, it could be the case that the structure and technology of agriculture items form a single dimension. If so, there would be reason to think a single coherent agricultural representation exists. It could also be the case that two or more representations will emerge to encompass attitudes expressing either conventional or alternative stances on structure and technology. In either instance, following methodology of Kim and Mueller (1978), summated indices constructed from the dimensions of the above items will become the dependent variable(s) for the analysis. The next step is to construct a measurement model predicting support for the newly created indices.

I will use ordinary least squares (OLS) regression and structural equation modeling (SEM) to test hypotheses, and compare the results from each of the two statistical modeling methods. The use of these different techniques should add reliability and assist in the interpretation of the findings. However, SEM models have several advantages over OLS regression. For example, they allow greater flexibility with the assumption of autocorrelation that is assumed to be zero in OLS regression analyses, they make it possible to test both direct and indirect effects, and they incorporate latent variables into the measurement model (Bollen 1989). For these reasons, if there are discrepancies in empirical support for the hypotheses, the SEM models will always be given greater credence.

Next, the same set of exploratory factor, OLS regression, and SEM analyses will be reproduced using data from both 1992 and 2001. If the results are comparable over

time, then the reliability of the findings will be corroborated further. If the structure and composition of the identified representations are shown to have longitudinal robustness, then this should add faith in the reliability of the dependent variables. While some changes may have taken place, it is presumed that the time interval of nine years is short enough that the representations should be similar. In addition, if the processes that explain support for the different representations are stable over time, then this should lend support to the reliability and robustness of the measurement models. This, in turn, would add confidence to the conclusions reached for each hypothesis test.

CHAPTER 5

MODELING AGRICULTURAL REPRESENTATIONS

This chapter encompasses the analysis portion of the study. I begin with the task of identifying the social representations of agriculture through the use of exploratory factor analysis (EFA). As will be shown, for both 1992 and 2001, there are four dimensions that indicate either a conventional or alternative stance on agricultural structure and agricultural technology. These are labeled conventional structure, alternative structure, conventional technology, and alternative technology. From this I construct four indices using the items associated with each of these four dimensions. The four indices are in turn used as dependent variables for testing the hypotheses stated in the previous chapter.

Next, I introduce the independent variables of the analysis, and briefly discuss descriptive statistics and inter-correlations. Hypothesis testing begins with an examination of the bivariate correlations. This is followed by three sets of ordinary least squares (OLS) regression analyses. The first set examines partial models that discern the effects of the independent variables, while ignoring the effects of the other independent variables in the model. The second set examines full models that are used to identify how the independent variables affect the dependent variables, while controlling for the other independent variables in the model. The third set of OLS analyses are the final models. These are the most parsimonious, and explain the most variation with the fewest variables. These three sets of OLS regression models—partial, full, and final—help to show how the different independent variables affect the four dependent variables under

different conditions. Yet, there are limitations to hypothesis testing inherent in OLS regression, and to address these I turn to structural equation modeling (SEM).

There are a number of advantages to SEM that should be noted at the outset, in addition to those that were mentioned earlier. First, SEM produces multiple goodness-of-fit measures for a particular model, allowing more confidence in the validity of the findings. Second, unlike OLS regression, SEM can handle simultaneous equations. This makes it possible to examine the four dependent variables simultaneously. Third, SEM allows more freedom in how the measurement model can be specified; namely, through the use of both latent and observed variables, as well as through the specification of direct and indirect relationships. Given these advantages, the interpretation of the findings will ultimately rely more heavily on the SEM findings. I now turn to the identification of agricultural representations.

Identifying Agricultural Representations

To identify the structure and composition of agricultural representations, I use exploratory factor analysis (EFA). Table 5-1 shows the descriptive statistics of the individual items used for this analysis, while Tables 5-2 and 5-3 show the correlation matrices of the items at both time points.

[Insert Tables 5-1, 5-2, and 5-3]

This analysis uses principle axis factoring with an oblique promax rotation. This is superior to the principal components method due to the issue of orthogonality—when factors are uncorrelated. If orthogonality is found between factors using principal components, it is difficult to determine whether or not the factors are truly uncorrelated or if the orthogonality is an artifact of the method. On the other hand, if orthogonality is

discovered with principal axis factoring, it can be concluded with confidence that it is not an artifact of the method (Kim and Mueller 1978).

Table 5-4 of the rotated factors shows the final solution with four dimensions containing three items apiece. The number of factors was determined by examining eigenvalues, the amount of explained variation, and through comparison with other possible solutions containing more or fewer factors.

[Insert Table 5-4]

As this table indicates for parallel items asked in 1992 and 2001, the rotated factor loadings are similar to the first decimal place. Given that these are separate samples drawn from the population at different points in time; this is a remarkable level of similarity. The biggest discrepancy can be found for the item that states, "Government policies should focus on helping large farms," because in 1992 this statement appended "be more efficient" to the end of the statement. There is a minor conceptual difference implied in this wording difference. Other differences between loadings might be attributed to slight changes in the representations of agriculture. For example, the item that states, "American farmers use more chemicals than are necessary to produce food," has a higher loading in 2001. This could mean that Americans are starting to feel more strongly opposed to the use of chemicals.

In sum, the four identified dimensions of attitudes about the structure and technology of agriculture are taken as indicators of four agricultural representations: conventional technology (CT), alternative technology (AT), conventional structure (CS), and alternative structure (AS). Summated indices were then constructed based on these agricultural representations.

Table 5-5 shows descriptive statistics for the agricultural representation indices. Glancing over the table, it becomes apparent that the indices are relatively stable over time. Also of interest is the fact that both alternative structure and alternative technology representations receive more support on average than do the conventional counterparts.

[Insert Table 5-5]

Cronbach alpha reliability coefficients are reported for each of the four indices in Table 5-5. In each case, the coefficients are either moderate or high, and are also quite similar over time. The lowest coefficient is for the conventional structure index. This is due to the fact that Cronbach's alpha is sensitive to the number of items in an index. If there were a battery of items, as opposed to three items, as is often the case in psychometric research, then these scores would likely be higher for each index.

As an extra test of validity, I examine how each index correlates with their constituent items. Higher correlations indicate that the indices will not produce radically different findings from the individual items, while low correlations would suggest otherwise. Of course, some unique variation is expected to exist with the indices when correlated with the individual items.

Results of this test are reported in Table 5-6. As this shows, for both time points all correlations are greater than or equal to.660, while most are greater than .700. Given these high correlations, I conclude that the results of hypothesis tests would be similar whether using the individual items or the summated indices as the dependent variables. Since the summated indices incorporate a more comprehensive level of information and are a better match to the goal of operationalizing social representations, they are preferable to the individual items.

[Insert Table 5-6]

Table 5-7 shows the correlation matrices of the four indices for 1992 and 2001. In general, the correlations between the indices are similar over time with some exceptions. The moderate negative correlations between the 1992 and 2001 conventional and alternative technology indices are within .009 of each other. The positive relationship between alternative structure and alternative technology increased slightly over time. The negative correlation between conventional structure and alternative technology has grown in magnitude. The magnitude of the negative correlation between conventional structure and alternative technology has also increased. And, the magnitude of the positive relationship between alternative and conventional structure diminished to the point of being a non-significant correlation in 2001.

[Insert Table 5-7]

What each of these changes suggests is that agricultural representations are becoming more logically consistent, whereby alternative is increasingly correlated with alternative, conventional is increasingly correlated with conventional, and alternative is increasingly negatively correlated with conventional. If this trend continues, then there may eventually be one alternative and one conventional representation of agriculture. The most puzzling finding is the correlation in 1992 between alternative and conventional structure, at which point there was a moderate positive relationship. This is probably an indication that people were supportive of all types of farms and farmers in spite of structure, possibly as a response to the 1980s farm crisis. But by 2001, these indices become virtually uncorrelated, suggesting that they are becoming more independent. In 2001, support for alternative structure has little consequence for whether or not a person

would support conventional structure. In contrast, support for alternative technology increases the probability that one would be opposed to conventional technology at both points in time.

Descriptive Statistics of Independent Variables

The independent variables for this analysis are grouped together by the concepts that they operationalize. Table 5-8 shows the descriptive statistics for the independent variables at both time points. Looking across these items, it becomes apparent that these data have comparable descriptive statistics over time with few exceptions. In the personal characteristics/SES category, the percentage of non-white respondents is greater in 2001. In the trust of communication network category, the "trust of business managers" item is slightly lower. In this case, some of the discrepancy can be attributed to the fact that the 2001 item had a slightly different wording, in asking about trust of business "executives" rather than "managers."

[Insert Table 5-8]

In the personal perception category of independent variables, the largest discrepancy over time can be found in the percent of respondents who have a friend or family member who owns a farm or ranch. Some of this probably reflects a true change, but there is also a variation in how this question was asked. In 1992, the items about friends and relatives owning a farm or ranch were asked as separate questions, while in 2001 it was asked as a single question. This is shown in detail in appendix 2.

Finally—again referring to Table 5-8—the items within the pre-existing ideas category are all in close proximity of each other between 1992 and 2001. This category contains one item that is an index labeled the Environmental Concern Index. The scale

reliability alpha coefficient is moderate indicating that the index is fairly reliable at both time points. The descriptive statistics of the items contained in this index are reported as well. Between the 1992 and 2001, there was very little change in the environmental concern index.

Tables 5-9 and 5-10 show the correlation matrices of independent variables for both 1992 and 2001. Without discussing the entirety of these tables, it is useful to focus on the highest correlations—i.e., those exceeding .500—as this may help anticipate issues of multicollinearity in regression analyses. To begin with, the trust items have a moderate correlation at both time points, particularly between business managers or executives and elected officials. As for the pre-existing ideas items, the environmental concern index is highly correlated with health concern. In terms of personal characteristics, education is moderately correlated with both income and age. Finally, a few personal perception items are moderately correlated with each other. For example, many individuals who own farms also live on farms and tend to report greater familiarity with farming.

[Insert Tables 5-9 and 5-10]

Bivariate Correlations of Indices with Independent Variables

Tables 5-11 and 5-12 show the bivariate correlations between the four dependent index variables and the different independent variables in 1992 and 2001, respectively. For conventional technology, in 1992, the highest bivariate correlations are with health concern, environmental concern, gender (female), agrarian land values, and trusting business managers. In 2001, these same variables appear, but in addition to them are

trust of elected officials and university professors, race (non-white), education, income, northeast region, and whether or not they grew up in the country.

[Insert Table 5-11 and 5-12]

For alternative technology, in 1992, the highest correlations are with health concern, environmental concern, trust of business managers and elected officials, agrarian land values, gender (female), owning a farm, and political liberalism. In 2001, they are health concern, environmental concern, trust of business managers, owning a farm, growing up on a farm, political liberalism, gender (female), race (non-white), income, and age.

In terms of conventional structure, in 1992, the highest correlations are with age, familiarity with agriculture, trust of elected officials and university professors, gender (female), and race (non-white). In 2001, they are trust of elected officials and business managers, gender (female), race (non-white), education, income, living on a farm, familiarity with agriculture, and the Midwest region.

Finally, for alternative structure, in 1992, the highest bivariate correlations are with agrarian occupation and land values, and political liberalism. In 2001, they are trust of elected officials and university professors, agrarian occupation and land values, environmental concern, education, income, age, the Western region, familiarity with agriculture, and whether or not they know a farm owner.

OLS Regression Models

OLS regression is used here to identify the effects of the independent variables discussed above—both independently and net of the other variables in the models—on the four different dependent variable indices: alternative structure, conventional structure,

alternative technology, and conventional technology, in both 1992 and 2001. These dependent variables are standardized and centered at their means in order to facilitate interpretation of the intercept, so that the models can be interpreted as deviation scores. The analysis will be divided into an examination of partial models, full models, and final models. The final models will ultimately receive the most consideration in terms of hypothesis tests. Prior to discussing these models, attention will turn to diagnostics in order to assess how well the assumptions of OLS regression have been met.

Regression Diagnostics

In order to establish that the findings of OLS regression are valid, it is necessary to consider the assumptions that this technique makes use of and to consider how well these assumptions have been met with respect to the current analysis. The assumptions of OLS regression are listed below:

1. The model is correctly specified
2. The error terms have a mean of zero
3. The error terms have constant variance (homoscedasticity)
4. The error terms are not correlated (autocorrelation)
5. There are no fixed explanatory variables
6. There is no linear relationship between independent variables (multicollinearity)

The ability to test Assumption 1 is limited. The best indication of model specification is the global F-test. Assumption 5 has been met because each of the variables in the analysis has at least some variation. To determine that the remaining assumptions—2, 3, 4, and 6—have been met; a number of diagnostic procedures were used.

Assumption 2 was tested by examining the residual statistics reported for each analysis. Each model in 1992 and 2001 reported a mean of zero. Thus, assumption 2 is

believed to have been met. Assumption 3 was tested through a visual inspection of the plot of the standardized predicted values of the error terms on the actual standardized residual values. For each of the analyses in 1992 and 2001, there were no indications of heteroscedasticity where a distribution resembles a sideways cone shape. Hence, assumption 3 is believed to have been met. Also, as an aside, the shape of this distribution gives no indication that there were any non-linear relationships. This means that it was safe to assume a linear model could be fit to the data.

Next, assumption 4 was tested by a visual inspection of the distribution of the error terms as a histogram, in addition to an inspection of the P-P plot (i.e., the probability-probability plot). Each of the histograms of the standardized residuals appeared to be normal. The P-P plot for the 1992 alternative technology perception model had a somewhat non-normal P-P plot. But since the histogram was normal in appearance, and since the problem did not appear in 2001, no corrective measures were taken.

Finally, assumption 6 was tested through an analysis of the condition index values, as well as the VIFs (variance inflation factors). The rule of thumb is that condition index values greater than 30 are problematic. The full models for both time periods have condition indices greater than 30, and are therefore questionable. The variables with the highest proportions of the variance—the sources of the multicollinearity—are age, education, and environmental concern. The highest VIF score is for the health concern item. Unlike 1992, in 2001 the problematic variables are age, income, and the agrarian occupations item. As the full models were not taken as the final models, no corrective measures were taken. In terms of the final models, the condition

indices are all beneath 30 for both 1992 and 2001. For the 1992 conventional structure and conventional technology models, the education and environmental concern items show some signs of multicollinearity. However, this issue can be addressed through the use of structural equation models, by specifying that items have a linear relationship.

Partial Models

Alternative Structure. Tables 5-13 and 5-14 show the partial models predicting alternative structure in 1992 and 2001. Each of the partial models is statistically significant at both time points, in terms of the global F-test. The trust and perceptions models predict the least amount of variation in alternative structure deviation scores relative to the other partial models. In 1992, trust in elected officials has a positive effect, while trust in business managers has a negative effect. In 2001, trust in elected officials has a negative effect, and trust in university professors has a positive effect. In both years, the highest standardized coefficients among the trust items are for the trust of elected officials items.

[Insert Tables 5-13 and 5-14]

For both 1992 and 2001, the partial model that explains the most variation in alternative structure deviation scores is the ideas model. In 1992, the standardized coefficients indicate—in order of magnitude—that agrarian land-use ideas, agrarian occupational structure ideas, political liberalism, and environmental concern are the most important predictors in the model. In 2001, these are agrarian land-use and occupational structure ideas, followed by environmental concerns.

The perceptions models in 1992 and 2001 account for a small amount of variation in alternative structure deviation scores. In 1992, self reported familiarity with

agriculture explains the most variation in the model and has a positive effect, according to the standardized coefficient. This is followed by whether or not the respondent knows someone who owns a farm or ranch and this had a negative effect. In 2001, these same items explained the most variation in the model, but the effect of knowing someone that owns a farm or ranch became positive. Also, those who grew up in the country scored higher in support for alternative structure, while those who personally owned a farm or ranch scored lower.

In 1992, the personal model shows that both income and region of residence—Northeast and Midwest—are the only statistically significant variables in the model. Income is predicted to lower deviation scores, while living in either the Midwest or the Northeast is predicted to result in higher deviation scores, as compared to the Southern region. In 2001, education, income, and region of residence are the statistically significant variables in the model. While not statistically significant in 1992, education is both significant and explains the most variation in 2001, and is predicted to have a negative effect on deviation scores. The effect of income is still predicted to be negative in 2001. The nature of regional differences changes completely in 2001, where the West is predicted to have a negative effect on alternative structure deviation scores, compared to the Southern region. Neither the Midwest nor the Northeast differs from the Southern region in 2001.

Conventional Structure. Tables 5-15 and 5-16 show the partial models predicting conventional structure in 1992 and 2001. In terms of the global F-tests, all partial models predicting conventional structure deviation scores are statistically significant in 1992 and 2001. At both time points, the partial model that predicts the most variation is the

personal model. The 1992 trust model predicts a positive relationship with conventional structure scores for both trust in elected officials and university professors, while trust in university professors explains slightly more of the variation. In 2001, trust in university professors is no longer statistically significant. Trust in elected officials predicts most of the variation, followed by trust in business managers. Both of these items are predicted to have a positive relationship with conventional structure scores.

[Insert Tables 5-15 and 5-16]

In the 1992 ideas model predicting conventional structure are two statistically significant variables: agrarian land values—that are positively related—and agrarian occupational values—that are negatively related. In 2001, the statistically significant variables are health concerns that are positively related and environmental concerns that are negatively related.

In terms of the perception models in both 1992 and 2001, self-reported familiarity with agriculture explains the most variation followed by whether or not the respondent lives on a farm. Both of these items are predicted to have a negative effect on deviation scores. For people who grew up in the country, the model predicts a positive effect on deviation scores, while for those who currently live in the country; the model predicts a negative effect on deviation scores at both points in time.

In terms of the personal models, all variables are statistically significant in 1992, and all variables, with the exception of income, are statistically significant in 2001. In 1992, age explains the most variation and has a negative effect, followed by gender, with females scoring higher. In 2001, gender explains the most variation with females scoring higher than males. This is followed by education, with a predicted negative effect on

deviation scores. Both the 1992 and 2001 models predict nonwhites to score higher than whites in terms of conventional structure deviation scores. Regionally, both models predict that people in the Midwest will score lower than people in the South.

Alternative Technology. Tables 5-17 and 5-18 show the partial models predicting alternative technology in 1992 and 2001. All of the partial models predicting alternative technology deviation scores are statistically significant, as determined by the global F-test. The 1992 trust model shows that there is a predicted negative effect of trust in business managers and elected officials. In 2001, the same effect is found for trust in business managers, while trust in university professors is found to have a positive effect.

[Insert Tables 5-17 and 5-18]

The ideas model explains the most variation in both 1992 and 2001. For both time points the variables explaining the most variation are environmental concerns and health concerns. These variables had a predicted positive effect on alternative technology deviation scores. In 1992, the perceptions model shows that there is a predicted negative effect on deviation scores for people that either own a farm or ranch or know someone who owns a farm or ranch. In 2001, individuals who own a farm or ranch, grew up on a farm, or currently live in the country, are all predicted to score lower in terms of alternative technology support.

With respect to the personal model, in 1992, the statistically significant variables are gender, age, and region. Being female and living in the west are predicted to result in higher alternative technology scores, while age is predicted to decrease scores. In 2001, the statistically significant variables are gender, age, education, and income. In this case,

being female and having more education are predicted to increase alternative technology scores, while being older and earning a higher income are predicted to decrease scores.

Conventional Technology. Tables 5-19 and 5-20 show the partial models predicting conventional technology scores in 1992 and 2001. As before, all of the partial models in 1992 and 2001 have statistically significant global F-tests. The trust model for 1992 predicts a positive effect on deviation scores to result from trust in both business managers and university professors. In 2001, the effect of these variables is repeated, and the positive effect of trust in elected officials emerges as well.

[Insert Tables 5-19 and 5-20]

The ideas model, in both 1992 and 2001, explains the most variation in conventional technology deviation scores as compared to the other partial models. In both 1992 and 2001, health concerns have the largest negative effect on conventional technology scores. In 1992, this is followed by the negative effect of environmental concerns, while in 2001 it is followed by the negative effect of agrarian land use values.

In the 1992 perceptions model people who grew up on a farm are predicted to have lower conventional technology scores, while the 2001 model predicts that individuals that grew up in the country will score lower. In 1992 self reported familiarity with agriculture and owning a farm or ranch had a predicted positive effect. In 2001 those currently living in the country are predicted to have higher scores.

Finally, for the personal models in 1992 and 2001, gender has the strongest effect with females predicted to score lower in terms of conventional technology. In 1992 age and education have a predicted positive effect on conventional technology scores, and in 2001 education and income are predicted to have a positive effect. For both time points,

living in the Northeast is predicted to lower conventional technology scores, as compared to those living in the South, while living in the Midwest or West are predicted to result in higher scores.

Full Models

Structure. Table 5-21 shows the full models for alternative and conventional structure in both 1992 and 2001. First, each global F-test is statistically significant and every category of independent variables contains at least one variable that is statistically significant in the full model net of the other variables. In 1992, the variables accounting for the most variation in alternative structure scores are agrarian land use ideas, familiarity with agriculture, living in the Midwest, political liberalism, and agrarian occupational ideas. In 2001, these are agrarian land use ideas, environmental concern, education, agrarian occupational ideas, and trust of elected officials.

[Insert Table 5-21]

In terms of conventional structure, in Table 5-21, again the F-tests and at least one variable from each category of variables are statistically significant. In 1992, the variables with the highest standardized regression coefficients are age, gender (female), and living on a farm. In 2001, these are education, gender (female), region (Midwest), trust of elected officials, race (non-white), and familiarity with agriculture.

Technology. Table 5-22 shows the full models for alternative and conventional technology in both 1992 and 2001. For alternative technology, in 1992, the variables with the highest standardized regression coefficients are environmental concern and health concern. For 2001 these are health concern, environmental concern, and distrusting

business managers. With regard to conventional technology in 1992, the highest coefficients are health concerns, gender (female), and education. In 2001, they are health concerns, trust of elected officials, and gender (female).

[Insert Table 5-22]

Final Models

To reiterate, the final models have the fewest number of variables that explain the most variation. These models can be generated by using the stepwise method of OLS regression analysis in the SPSS statistical package, rather than the enter method that is the default setting used in the earlier models. This is an automated method that starts with a set of variables and selects the one with the highest amount of explained variation in the dependent variable as the first to enter into the model. Additional variables are then added incrementally with the next highest amount of explained variation. The iterations continue until the amount of explained variation begins to level out, in terms of eigenvalues.

Structure. Table 5-23 shows the final models for alternative and conventional structure in both 1992 and 2001. The trust of elected officials item is statistically significant in all of the final structure models. For alternative structure, the predicted effect is positive in 1992 and negative in 2001. For conventional structure, it is positive for both years. The agrarian land use item is also statistically significant in all four structure models, with a predicted positive effect in all but the 2001 conventional structure model. Also statistically significant for each model is self-reported familiarity

with farming. The predicted effect is positive for the alternative structure models in 1992 and 2001 and it is negative for the conventional structure models in 1992 and 2001.

[Insert Table 5-23]

With regard to alternative structure, agrarian land use ideas have the highest standardized coefficients. Education and environmental concern also emerge in 2001 as important predictors. For conventional structure in 1992, the variables explaining the most variation in the model are age and gender. In 2001 they are education, region (Midwest), trust of elected officials, gender (female), and race (non-white).

Technology. Table 5-24 shows the final models for alternative and conventional technology in both 1992 and 2001. Four all four technology models, trust in elected officials, health concern, environmental concern, and gender were statistically significant predictors. Alternative technology has as its highest predictors, environmental concern and health concern in both 1992 and 2001. For conventional technology in 1992, the highest predictors are health concern and gender, while in 2001 they are health concern, trust in elected officials, and gender (female).

[Insert Table 5-24]

Summary of OLS Regression Analysis Findings

Of the variables in the partial trust model predicting alternative structure scores, only trust of elected officials remains statistically significant in the full and final models. Of the variables in the partial ideas model, only the agrarianism items are statistically significant in the full and final models for both years. Of the partial perceptions model, the items having to do with familiarity with agriculture and knowing someone who own a

farm or ranch are the only items to remain statistically significant in the full and final models. And, of the partial personal model, none of the items remained statistically significant at both points in time in the full or final models. Thus, ideas that individuals have about the importance of agriculture as both an occupation and a land use are the best predictors of support for alternative structure, combined with the level of familiarity individuals have with agriculture.

With regard to conventional structure scores, the partial trust, full, and final models show that trust in elected officials has a statistically significant positive effect at both points in time. The full model reveals that agrarian land use values and environmental concern are statistically significant predictors over time, while the partial ideas models were less consistent with these items. Both the partial perceptions and full models show that living on a farm and being familiar with agriculture are consistent predictors of conventional structure scores over time, while the final model revealed only familiarity with agriculture to be statistically significant and to have a negative effect over time. In terms of personal characteristics, gender (female), race (non-white), education, and region were all statistically significant in the partial, full, and final models at both time points. In sum, personal characteristics—female, nonwhite, less educated, and Midwestern—are the best predictors of support for conventional structure.

In predicting alternative technology scores, the partial trust and full models reveal that the trust of business managers or executives has a consistent negative effect over time. The final model showed this to only be the case in 1992, and that trust in elected officials is the only item to have a statistically significant negative effect over time. The partial ideas, full, and final models show that both health and environmental concerns

have a consistent positive effect over time. None of the partial perceptions model items were statistically significant over time in the full model. In the final model, owning a farm had consistent negative effect over time. In terms of personal characteristics, both the positive effect of gender (female) and negative effect of age were statistically significant over time in the partial and full models. In the final model, age is the only variable to remain statistically significant over time. In sum, concerns for human health and the environment, followed by distrust of business managers and executives, are the best predictors of support for alternative technology.

In reviewing conventional technology scores, both trust in elected officials and trust in business managers or executives have consistent positive effects in the full model, while trust in university professors has a positive effect over time in the partial trust model. In the final model, trust in elected officials is statistically significant and predicted to have a positive effect over time. In the partial ideas model, full model, and final model, health concern and environmental concerns had a consistent negative effect over time. None of the perceptions items were statistically significant over time. And gender is the only personal characteristic that has a negative effect over time in the final, full, and partial models. In sum, conventional technology support is mainly a function of how unconcerned individuals are about the environmental and health safety of the food they eat, how trusting they are of business and government for information, and their gender (female).

Structural Equation Models

In this section structural equation modeling (SEM) is used in order to gain a better understanding of how the representations of agriculture are related to the independent

variables examined previously with OLS regression. SEM provides a number of ways to bypass the problems of multicollinearity and autocorrelation that was discussed in the diagnostic section of the OLS regression analysis.

Figures 5-1 and 5-2 show the SEM models for the 1992 and 2001 data, respectively. As these figures illustrate, latent variables were used to measure the effects of personal perceptions of agriculture, sustainability concerns, and agrarianism. The use of these latent variables is the major point of departure from the OLS models tested earlier. These models are also specified differently in terms of identifying different direct and indirect effects. Finally, because SEM allows for a system of equations to coexist, each of the dependent variables can be estimated simultaneously. For this reason SEM models are also referred to as systems of equations or simultaneous equation models.

[Insert Figure 5-1 and 5-2]

Re-examining Technology and Structure with SEM Models

Technology. Table 5-25 and Table 5-26 show the regression coefficients for the 1992 and 2001 SEM models, respectively. In examining the total effects for conventional technology in 1992 and 2001, the variables explaining most of the variation are the latent variable, sustainability concerns, and the observed variable, being female. For alternative technology the most important variables were the latent variables: sustainability concerns and perceptions, and the observed variables: trust of business managers or executives, political liberalism, and being female.

[Insert Table 5-25 and 5-26]

Structure. Referring back to Table 5-25 and 5-26, for conventional structure, the variables age and living in the Midwest had strong negative effects, while gender and

trust of elected officials had moderate positive effects, for both 1992 and 2001. In 2001, sustainability concerns had a moderate negative effect on the conventional structure score. With respect to alternative structure, the latent variable agrarianism had the largest positive effect of all the variables. In 1992, this was followed by personal perception and in 2001 by sustainability concerns and personal perceptions. In both years, income had a slight negative effect on alternative structure scores.

Examination of Latent Variables

Unlike the OLS regression models the SEM models include latent variables, and these are considered here. In the measurement models identified some of these latent variables act as intervening variables. Table 5-27 reports both the factor loadings as well as the standardized regression coefficients and squared multiple correlations of these latent variables.

[Insert Table 5-27]

As Table 5-27 reveals, the factor loadings of the three latent variables are quite consistent over time. The standardized regression coefficients show a similar level of comparability. One difference is that sustainability concerns account for more of the variation in agrarianism in 2001, and personal perceptions account for less variation in agrarianism in 2001, as compared to the 1992 model.

Goodness-of-Fit Diagnostics

Another advantage of SEM is the ability to assess the fit of the model to the data, in order to determine whether or not the model is correctly specified. Unlike OLS regression, which relies solely on the global F-test, there are several goodness-of-fit

measures to consider with structural equation models. It is important to consider the full range of information that these provide in order to determine model fit. The first of these is the χ^2 test of significance for overall fit. This tests the idea that the sample implied covariance matrix is a close estimation of the population covariance matrix, or that $\Sigma(\Theta)= \Sigma$, so that the residuals of $\Sigma - \Sigma(\Theta) = 0$ (Bollen 1989). The null hypothesis is that the model is a good estimation of the population parameter. Rejecting the null in this case means that the model is not a good fit to the data—a non-intuitive interpretation for those accustomed to other overall tests of significance, such as the global F-test in a regression analysis. However, this measure is susceptible to sample size, and there are no unambiguous cutoffs. One rule of thumb, suggested by Marsh and Hocevar (1985), is to have a ratio of χ^2 to degrees of freedom of less than five to one. At the other extreme, it has been suggested that this ratio should be no more than two to one (Bryne 1989).

A related measure—the Hoelter Critical N test (CN)— reports the sample size necessary to achieve a statistically non-significant χ^2 value. It is generally believed that 200—meaning a sample of 200 people will result in a non-significant value—is an acceptable CN value. Thus, while there are no cutoffs for the χ^2 test, the goodness-of-fit can be evaluated alongside the CN value.

Other goodness-of-fit measures analyze the relative fit of the model to the data, or the ability of the model to reproduce the sample implied covariance matrix. Included here are the Normed Fit Index (Δ_1), Relative Fit Index (ρ_1), Incremental Fit Index (Δ_2), Tucker Lewis Index (ρ_1), and Comparative Fit Index (CFI). Interpretation of these indices is that the closer they are to one; the better is the fit to the data. Again, there are not any preset cutoff points for these measures, but in general .9 is a conservative value.

Another common measure is the RMSEA (Root Mean Square Error of Approximation), whereby values falling under .05 are considered acceptable. However, the RMSEA is susceptible to models with several parameters.

The goodness-of-fit measures for the current SEM models are presented in Table 5-28. For this analysis, there is very little background information to inform the expectations of the research. Previous research has not used SEM, and thus is not informative with regards to setting the parameters of the general model. Some ideas in the model are informed by social representation theory, but this has not been previously tested in a comparable manner. Given this lack of prior research, interpretation of the goodness-of-fit measures will not be held to the most stringent criteria and cutoffs. This is acceptable given the conventions of exploratory SEM research.

[Insert Table 5-28]

In terms of global fit, there is a statistically significant χ^2 value. However, the χ^2/df ratio falls between 2 and 5 for both models, indicating a good fit. Also, the CN value far surpasses the minimum of 200 in both cases. Next, in terms of relative fit, all but the relative fit index measures are over .9 for the 1992 model. For the 2001 model, all measures are close to .9. Finally, for both models, the RMSEA value falls below the typical cutoff of .05. Therefore, given the generally acceptable goodness-of-fit measures, I conclude that the models are both a good global estimation of the population and also that the models estimate a good fit to the sample implied covariance data.

Comparison of OLS and SEM Results

Alternative Technology. For alternative technology, the OLS final models in 1992 and 2001 show that environmental and health concerns were the best predictors. In the

SEM models, these items are part of a latent variable measuring sustainability concerns, and this is the best predictor. A key difference in the findings from the two techniques is on the importance of personal perceptions of agriculture. The OLS models do not show personal perception to have a very large effect on alternative technology scores. However, the structural equation models show personal perception to have a moderate and negative indirect effect that is moderated by sustainability concerns. Another difference between the two techniques is the squared multiple correlation. The 1992 and 2001 OLS squared multiple correlations are .402 and .301, respectively. For the SEM models, they are .760 and .749, respectively. In other words, the SEM models account for more variation in alternative technology scores than do the OLS equivalents. This suggests that the use of latent variables with direct and indirect effects can account for more variation.

Conventional Technology. For conventional technology, the OLS models predict that health concerns and being female will have a moderate to strong negative effect, while trusting elected officials has a moderate positive effect. Consistent with this, the SEM models show that sustainability concerns and being female both have strong negative effects. However, the SEM models show a moderate positive effect from trusting business managers. Both OLS and SEM show a slight positive effect of education. The squared multiple correlations of the 1992 and 2001 OLS models are .268 and .293, and for the SEM models are .350 and .400, respectively. Although not as dramatically different as the alternative technology model comparison, the conventional technology SEM models account for slightly more variation than the OLS models.

Alternative Structure. For alternative structure scores, the 1992 and 2001 OLS final models show that agrarian land values and agrarian occupational values are the most important predictors. For the SEM models, the predictors with the biggest standardized coefficients are the three latent variables: agrarianism, perception, and sustainability concerns. Thus the main difference is on the importance of personal perceptions of agriculture. The latent variable for perceptions has an indirect effect that is moderated by sustainability concerns, and this is not part of the OLS model specification. In terms of the squared multiple correlations, the 1992 and 2001 OLS models are .123 and .258, while for the SEM models they are .304 and .309. Hence, the SEM models account for slightly more variation than the OLS models in 2001, and a great deal more of the variation in 1992. In addition, the SEM models produce more reliable coefficients across time periods, suggesting that they are more stable models.

Conventional Structure. The 1992 and 2001 OLS final models show that personal characteristics like age, education, region, and gender, along with trust in elected officials are important predictors of conventional structure. Overall, the SEM models support these findings. The squared multiple correlations for the 1992 and 2001 OLS models are .121 and .203, while for the SEM models they are .083 and .118, respectively. Therefore, unlike the previous comparisons, the SEM models in this case appear to account for less variation than the OLS models. However, the SEM models are specified differently and produce more reliable coefficients because they are a better fit to the data. Nevertheless, conventional structure scores appear to be the most difficult to predict with these data.

Hypothesis Test Conclusions

At this point it is possible to provide some conclusions with regard to the hypotheses that were set forth in the previous chapter. The level of support for each hypothesis is shown in Table 5-29. Results from both the final OLS regression and SEM models are used to determine whether or not there is support for each hypothesis in 1992 and 2001. Presented in this way, any discrepancies between the two methods or time points should be evident.

[Insert Tables 5-29]

Trust of the Network

In looking across the dependent variables in Table 5-29 it becomes clear that trust of the communication network does have an influence on how people think about agriculture. For conventional technology, support was found for each item in the SEM model at both time points, and support was found for all but the university professors item in the OLS model at both time points, suggesting possibly opposing views about the conventional stance of professors. For alternative technology scores, everything except the university professors item received support for at least one time point in both the OLS and SEM models. For conventional structure, the SEM model showed support for each item for at least one time point, while the OLS model did not support the business managers item. For alternative structure, only the business managers item received support from the SEM models in 1992 and 2001, and only the elected officials item received support for the OLS model in 2001. Thus, alternative structure stands out as having less to do with the trust of the network than the other dependent variables.

Pre-existing Ideas

The pre-existing ideas hypotheses shown in Table 5-29 receive mixed support from both the OLS and SEM analyses. On one hand, the latent sustainability concern variable, of which the environmental and health concern items are a part, shows consistent support at both time points for both the OLS and SEM models. On the other hand, political liberalism is only supported in the 2001 SEM model for each dependent variable, and the 1992 OLS model predicting alternative structure. In addition, the agrarian latent variable, of which agrarian occupational and land values are a part, find little support for all but the alternative structure hypotheses. However, the alternative structure hypotheses receive support at both time points for both the OLS and SEM models. Hence, agrarianism seems to be mainly related to support for alternative structure, while sustainability concerns appear to mainly influence support for alternative technology.

Personal Perceptions

Looking across the dependent variables at the personal perceptions items in Table 5-29, a consistent disparity exists between the OLS and SEM results. This is due to the fact that the SEM models treat perceptions as a latent variable with both direct and indirect effects. The conventional structure hypotheses are the only ones that lack support from the SEM model. For the other dependent variable hypotheses, support is found in both 1992 and 2001. The OLS models in 1992 and 2001, on the other hand, show a mixed level of support. There are few cases where these models find support for both 1992 and 2001.

The upshot of this is that personal perceptions of agriculture appear to have an influence on the types of pre-existing ideas that individuals have, and these in turn influence support for the different social representations. Specifically, individuals who are personally involved in agriculture are typically less concerned about the environmental and health risks of agriculture and are more agrarian in their beliefs. Thus, indirectly this means that these individuals are less supportive of alternative technology, but more supportive of alternative structure.

Personal Characteristics and SES

The final set of hypotheses deal with personal characteristics and socioeconomic status (SES), and this is shown in Table 5-29, above. Looking across dependent variables, it appears that regional differences exist in every instance. Gender appears to influence views of technology most of all, receiving support from both the OLS and SEM models at both points in time. It also has some influence on views of structure, as is supported by the SEM model for alternative structure. The race hypotheses receive little to no support overall, while the 1992 OLS and SEM models for conventional technology do receive support. Age also receives somewhat mixed support, with most going to the negative effect it has on conventional structure. Education only appears to have a negative effect on support for conventional technology. Finally, the income hypotheses are supported for both conventional technology and alternative structure.

CHAPTER 6

CONCLUSIONS ABOUT AGRICULTURAL REPRESENTATIONS

As the last chapter showed, this analysis is grounded in longitudinal data with a remarkable level of similarity between 1992 and 2001 that bolsters confidence in both the robustness of the models and representativeness of the samples. Overall, this study finds that Americans have developed four agricultural representations based on conventional or alternative views of structure and technology. They tend to prefer the small and family farm base of alternative structure, while resisting the consumption of foods produced with conventional technologies, such as pesticides, irradiation, hormones, and antibiotics. Individually, Americans differ as to whether or not they support conventional or alternative agriculture. Attitudes are influenced by whether or not people trust the information they hear from the different institutions and agencies tied to conventional agriculture. They are also informed by the reality that individuals experience and perceive on a daily basis. Clearly, if one farms or knows farmers their views will be anchored in reality. However, it is not necessary to be a farmer to have an opinion about agriculture, although a lack of personal perception and experience does mean that representations will have less of a basis in reality.

Social representation theory suggests that representations can come into existence if they are compatible with pre-existing cultural ideas. In support of this proposition, this study finds that individuals who have concerns about the environmental and health impacts of agriculture tend to score higher on the alternative technology representation. In addition, it finds that individuals who hold agrarian values tend to score higher on the

alternative structure representation. However, the explanation of support for conventional structure remains inadequate. It may be the case that economic values, such as neo-liberalism and utilitarianism will contribute to this, as the agricultural paradigm literature suggests. By the same token, scientific values may have some influence. In either case, future research should operationalize these sets of values to test these relationships.

Theoretical Implications

Therefore, this dissertation finds that the three main propositions of social representation theory—as it has been used here—are predictive of how Americans think about agriculture. This is true even when considering personal demographic and socioeconomic characteristics. To reiterate, these propositions were 1) Communication networks must be trusted in order for information to have an effect on the individual attitude, group paradigm, or social representation, 2) Individual attitudes can be affected by the individual's own personal perceptions of reality, and 3) Attitudes, paradigms, and social representations are directly influenced by pre-existing ideas at the individual, group, and supra-group level.

In examining proposition 1 the trust of information from traditionally conventional sources is clearly relevant. However, among the items used to test this, university professors yielded the most unpredictable conclusions. This could indicate a change whereby university professors are coming to be viewed as more alternative. This is consistent with the findings of the ACAP study discussed in Chapter 3 that found diversity in the views among university professors at Washington State University, depending on their discipline (Dunlap et al. 1992).

Proposition 2 has to do with personal perceptions of farming—sometimes referred to as the social distance from agriculture—and was likewise an important part of the explanation of agricultural representations. However, unlike the other predictors, personal perceptions had more of an indirect relationship. This is because individuals that were closer to agriculture had fewer concerns about the environmental and human health risks of agriculture. In turn, this made them more conventional in their views of technology. On the other hand, the same individuals had greater feelings of agrarianism, or the importance of agriculture to society as an occupation and as a land use, and this made them lean more in the direction of favoring alternative structure.

The most important proposition to emerge is clearly proposition 3 that deals with pre-existing ideas. In particular, concerns about the sustainability of the environment and of human health were most important to the explanation of the alternative technology representation. Meanwhile, feelings of agrarianism were most important to the explanation of the alternative structure representation. Nevertheless, while much of the variation in alternative representations has been explained by the statistical models set forth in this research, there is room for greater explanation of the conventional representations. One recommendation for future research, as mentioned earlier, is to incorporate other sets of pre-existing ideas, such as economic productivity and efficiency as well as science and technology. Due to a lack of available data on these ideas, they could not be adequately tested in this dissertation. But future research should collect data that operationalize these notions, and test hypotheses relying on agricultural paradigm research for direction.

Personal Characteristics and Social Identity

Interestingly, this dissertation suggests that personal demographic and socioeconomic characteristics are less important in the prediction of agricultural representations when the concepts derived from social representation theory are taken into consideration. This is an important finding, since much of the literature on agricultural attitudes and paradigms has focused so heavily—if not solely—upon personal demographic and socioeconomic characteristics. However, there is still room for more research in this vein. One of the main reasons for believing this to be the case is the potential for integrating social representation theory with social identity theory. Although that would go well beyond the scope of this dissertation, incorporating propositions from social identity theory could be heuristic to understanding how Americans think about agriculture in future research.

A social identity is defined by Tajfel (1982: 2) as that "part of the individual's self-concept which derives from their knowledge of their membership of a social group (or groups) together with the value and emotional significance attached to that membership." The central contribution of social identity to social representation theory is the idea that people gravitate toward the attitudes, beliefs, values, and behaviors of the groups to which they belong and to which they view as the most salient. The saliency of group memberships can vary over time allowing individual identities to shift. Hence, an examination of saliency of membership could be productive in future research.

Breakwell (1993) states that there are three specific ways that identity can influence social representations. First, group membership influences exposure to the social representation and/or exposure to the target of the social representation. For

example, belonging to the 4-H club not only exposes children to certain ideas about farming, it also exposes them to the actual hands-on act of farming. Second, group membership influences the kinds of information sources are deemed to be trustworthy, thus influencing how social representations affect individual attitudes. For example, membership in scientific groups may encourage members to distrust statements from religious leaders, and vice versa. Third, Breakwell contends that membership influences how people use representations, in terms of making decisions, assimilating new information, and evaluating situations.

In sum, what these observations imply is that social identity, when considered as a broader concept than a mere aggregation of personal characteristics, can be useful to understanding the full picture of agricultural representations. They also suggest that the personal perceptions of agriculture might also be considered as being part of one's social identity, and this clearly opens the door to additional research questions. Future research might benefit from examining membership in specific clubs and other types of formal and informal groups. It could also be the case that there are interaction effects between personal characteristics and the different pre-existing ideas, of which this dissertation has not explored.

Polemical Representations of Agriculture

This dissertation underscores the idea that there can be a diversity of social representations in society rather than one overarching hegemonic collective representation. In this case, there are in fact two sets of polemical representations about conventional vs. alternative structure and technology. As a result, social representation theory suggests that propaganda is the central means for communicating ideas. Therefore

another line of research would be to examine the propaganda of alternative and conventional agriculture. What are the mediums for this propaganda? Who do they target? What agenda do they encompass? Is the conventional propaganda winning out because of access to greater economic and political resources? These are just some of the questions to be explored. These questions are interesting both from a basic academic view, as well as from an applied policy perspective.

Policy Implications

In addition to the theoretical dimensions just discussed are the policy implications of this research. The late Frederick Buttel (2003) commented that there is a need for rural sociologists to be more active participants in the discussion of agricultural policy as this debate is currently dominated by agricultural economists. In this capacity, I would like to carefully consider how this dissertation can be brought to bear on the existing policy situation in agriculture. To do so, I will begin with a discussion of past policy pitfalls, then move into a consideration the social structural arrangement of policymaking, and outline some possible future directions.

A Brief History of Policy

Farm Bills come out of Congress roughly every five years to institute changes that address problems arising from past policies or to address changes within the industry of agriculture itself. In a sense, they are the political response to the agricultural transition. Early New Deal policies were centered on preserving the economic viability of farming by incorporating price supports, acreage allotments, parity, and production controls.

While these subsidies were always considered short term solutions, the need for them continued to re-emerge year after year (Winders 2001, 2004).

In spite of New Deal policy efforts, agriculture became economically untenable with devastating effects for rural areas. While the economic benefits subsided, both the environmental and health impacts gained greater national notoriety. As a result, sustainable farming—as embodied by the idea of organic—became a central concern. The 1981 Farm Bill was the first to implement minor support for research on organic farming, and the 1985 Bill went further by providing greater resources for research on natural resource conservation and environmental protection (Schaller 1998). The 1990 Farm Bill was the first to call for national standards of organic farming, and created the Sustainable Agriculture Research and Education (SARE) program.

Recent Farm Bills can also be characterized as embracing the neoliberal idea of increased participation in the global economy. The 1996 Farm Bill typifies this as it called for greater global trade as a replacement for traditional New Deal subsidies (Schaller 1998). However, farmers have continued to rely on emergency payments in spite of officially ending New Deal policy. The 2002 Farm Bill institutionalized emergency payments, and these are estimated to cost taxpayers between $5 and $9 billion annually; most of which goes to a small percentage of large corporate farms (Ikerd 2002).

The issue of neoliberalism in agriculture stems from a larger debate about the appropriate relationship between state, society, and markets as described by O'Riain (2000). Overall it seems that the U.S. has moved in the direction of allowing markets to dominate both the state and society, as the case of agriculture illustrates. Social rights states—such as those found in Western Europe—involve an alliance between society and

the state that dominates the role of markets. Social rights states are concerned with protecting farmers and disallowing markets to drive prices to unprofitable levels. Globalization and regionalization—such as membership in the European Union—are threatening to transform social rights states to fit the neoliberal ideal. But if the case of the U.S. is indicative, then the future may be bleak as neoliberal policies have not provided the benefits promised by participation in the global economy. This is evidenced by the fact that state intervention continues to be necessary in order to keep commodity farms in operation.

The Structure of Policymaking

The failure of policy to meet the needs of individual and family farmers has often been blamed on the political power of the non-agricultural majority, who are believed to be more interested in bringing down the price of food than protecting farmers. But this dissertation shows that the non-agricultural majority—most Americans—are overwhelmingly supportive of small and family farms, as well as products grown using alternative technologies. And, while policies on sustainable and organic agriculture reflect American support for alternative technology, they do not reflect in the same proportion support for alternative structure. To the contrary, policies have promoted large and corporate farms competing on a global scale.

In turn, the political weakness of American farmers should be of little consequence since the non-agricultural majority is sympathetic towards their needs. So why has policy continued to let them down? The reason may have to do with a third factor: special interest groups tied to the business of agriculture. Agri-businesses have an agenda that is decidedly different from that of farmers because farmers have an interest in

getting paid more for their products while agri-businesses have an interest in paying less. New Deal price supports ensured that farmers of some commodities would receive a guaranteed minimum price, but the most recent Farm Bills that removed these supports have resulted in a gain for agri-businesses and a loss for farmers (Lobao and Meyer 2004).

Therefore, although American farmers are aware that their interests do not match those of agri-business, they are too weak politically to oppose them. The question then becomes, why has the non-agricultural majority not asserted its political influence to demand policies that promote an alternative structure of small to medium sized family farms? The answer to this may be that they are guided by a false representation of reality that equates the success of agri-business with the success of farmers. If this is the case, then a more accurate representation of reality may lead to a new direction in policy.

Closing Remarks: Three Possible Future Directions

I now conclude with a consideration of three possible future directions that agriculture can take. The first entails the prospect of a cultural acceptance of the agricultural transition whereby Americans learn to live with the reality of large and increasingly corporate farms and thus become more conventional in their representations. This would resemble the diffusion of a hegemonic conventional representation. The second possible direction entails a serious effort to change the reality of agriculture to a more alternative structure. This would require public education about the divergent interests of farmers and agri-businesses and of the fact that policies do not reflect preferences for an alternative structure. It would also require major reforms in that policy that may elicit heavy resistance from agri-business. The most probable outcome is a third

direction that falls between these extremes. This would entail a compromise, whereby cultural beliefs become more conventional and the system of agriculture becomes more alternative. This meeting-in-the-middle would likely improve the situation for farmers, but it would not radically challenge the force of the agricultural transition.

On the other hand, the disparity between the reality and representation of agriculture may continue to endure. If the American public continues to believe the myth that supporting agriculture is the same as supporting small to medium sized family farmers, then the industry of agriculture can charge ahead while many of the small and medium farms are sold or otherwise disappear. If this happens, then most of the farming needs of America will be met through corporate farms—via contract farming—or by farmers in distant parts of the world through outsourcing. This of course raises the issue of increased dependence on foreign countries for our food needs, and the associated concerns of national security that this entails.

Regardless of which path is taken, it is the hope of this author that Americans are at least in control of their own destiny. The future of farming and agriculture should not be decided by a handful of lobbyists and politicians whose views are not necessarily representative of the public. But in order for Americans to be more responsible citizens, there is a need for greater education about these matters. Only then can policy—and reality—reflect American agricultural representations.

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APPENDICES

APPENDIX 1

TECHNICAL NOTES ABOUT THE DATA

The data used in this analysis from 1992 and 2001 are actually preceded by a third survey that was administered in 1986. Because of a lack of complete data, this third survey was not included in the present analysis. Nevertheless, from the standpoint of how the other two questionnaires were developed and administered it has direct relevance. Hence, this appendix will be discuss briefly how all three survey questionnaires are related, and will compare a number of items from the resultant datasets with each other, and with other national surveys given during the same time frames.

Background and Survey Design

The 1986 "Farming in American Life," the 1992 "Food, Farming and the Environment," and the 2001 "Food from Our Changing Planet: What Do You Think?" surveys were developed collaboratively by members of the S198, S246, and S276 research teams, respectively. The bulk of the items used in the questionnaires are based on previous research on agricultural attitudes, as well as from concerns over relevant policy issues. Both the 1986 and 1992 questionnaires were administered by Auburn University, while the 2001 questionnaire was administered by North Carolina State University. In each case the printed institutional affiliation reflected this.

A great deal of pre-testing preceded all three questionnaires. Each followed the guidelines outlined by Dillman's Total Design Method (1978). Each used a stratified random sample of persons in the United States using lists obtained from national marketing firms. These include Donnelly Marketing in Nevada, Iowa for 1986, Survey Sampling Inc. in Fairfield, Connecticut for 1992, and Genesys Sampling Systems of the

Marketing Systems Group in Fort Washington, Pennsylvania for 2001. These lists were constructed from residential telephone subscribers and automobile owners.

The 1986 sample consisted of eight strata with 4,000 households each. In 1992, there were 5,250 households in each of the eight strata, while in 2001, there were 6,039 households. The first two surveys used over-sampling of certain states, bringing the total sample to 9,250 households in 1986, and 10,000 in the 1992. The respondents from each state in which over-sampling took place were assigned appropriate weights to represent the proportion of that state's population in the national population. In 2001, the sample was stratified proportionate to the nine census divisions of the United States, rather than by individual states. Originally, 6000 households were requested for the study, but when it was discovered that Alaska and Hawaii had not been included, the total number of households was raised to 6,039 so that these states could be added to the ninth census division.

Survey Administration and Sample Representativeness

In the initial mailing, a questionnaire, cover letter, and return envelope were sent on January 31, 1986 for the S198 survey, on February 17, 1992 for the S246 survey, and on July 10, 2001 for the S276 survey. A first reminder postcard followed the initial mailing. For the 1992 survey, this was sent seven days after the initial mailing. In the 1986 survey, this postcard was sent ten days after the initial mailing. The delay in the latter was due to a printing error and the consequent need to reprint the postcards. For the third questionnaire, it was mailed 16 days later. A second questionnaire, cover letter, and return envelope was sent approximately ten days after the first reminder postcard to all individuals for whom no response had been received. In 1986, an additional second

postcard reminder was sent ten days after the mailing of the second questionnaire. In the first two surveys, a third questionnaire with a different cover letter was sent approximately one month after the second questionnaire to all individuals for whom no response had been received. All mailings generated "bad address returns," "moved," "deceased," and other notices. In 2001, a second questionnaire was sent with a different cover letter 20 days after the reminder postcard went out. A third wave of questionnaires was initiated with a phone call, which spanned across the first seven days of the third wave (November 21-27, 2001). During this week questionnaires were mailed to the various census divisions on November 21, 26, and 27.

Sample Representativeness

The 1986 survey accounted for 56 percent of the sample with a return rate of 46 percent. In the 1992 survey, 47 percent of the sample was accounted for with a response rate of 37 percent. And in 2001, 37.6 percent of the sample was accounted for with a response rate of 18.6 percent. The following breakdowns provide an accounting of the questionnaires mailed to all three national samples.

Sample accounting in the 1986 survey:

Known = [(completed + refused + deceased + bad addresses) / 9,250] * 100
55.8% = [(3,239 + 188 + 61 + 677 / 9,250] * 100
Return Rate = [(completed + refused + deceased) / (9,250 - bad addresses)] * 100
46.1% = [(3,239 + 188 + 61) / (9,250 - 1,677)] * 100

Sample accounting in the 1992 survey:

Known = [(completed + refused + deceased + bad addresses) / 10,000] * 100
46.7% = [(2,866 + 165 + 56 + 1,587) / 10,000] * 100
Return Rate = [(completed + refused + deceased) / (10,000 - bad addresses)] * 100
36.7% = [(2,866 + 165 + 56) / (10,000 - 1,587)] * 100

Sample accounting in the 2001 survey:

Known = [(completed + refused + deceased + bad addresses +other) / 6,039] * 100
37.6% = [(819 + 19 + 14 +1,408 + 8 / 6,039] * 100
Return Rate = [(completed + refused + deceased + other) / (6,039 - bad addresses)] * 100
18.6% = [(819 + 19 + 14 +8) / (6,039 – 1,408)] * 100

Upon reviewing the return rate as well as the accounted for rate for the 2001 survey, a number of nonrespondents were identified to be outside the range of the sampling frame, either due to age restrictions, or due to the fact that they had moved or were deceased. As a result, the number reported is conservative, with the actual rate probably coming closer to 20 percent.

Ideally, return rates would be in the seventy or eighty percent range. Nevertheless, the representativeness of samples depends on a number of issues beyond that of the return rate, although this is typically usually viewed as the most important indicator. Other important indicators include that nature of the non-respondents, institutional sponsorship, and the saliency of the issue. Agricultural issues may not be salient for much of the public. For individuals who do find agriculture to be salient, they are typically more elderly and less likely to return a mail questionnaire. Moreover, respondents to mail questionnaires must be literate and have a mailing address; two criteria that are not met with respect to all possible adults in the population. Because the return rates were so low, the research teams decided that the data could be weighted by census parameters, in order to bolster confidence in the representativeness.

Statistical Weighting

The weighting procedure that was used gives members of under-sampled groups a greater case-weight and members of over-sampled groups a smaller case-weight. The

effect of this is to restore representativeness to the sample. Even samples with high return rates can benefit from this procedure, especially if there is a bias in the nature of the nonrespondents (Sonquist and Dunkelberg 1977). Finally, Lansing and Morgan (1971) suggest that analyses that are multivariate are more robust against sample biases created from low return rates.

The criteria that were used in constructing these weights are age, sex, race, education, income, and residence. For the 1992 and 1986 surveys, residence refers to state residency, while in 2001 it refers to census region residency. Population parameters were obtained for these criteria using the U.S. Census. Since the 1992 and 2001 surveys were administered in close proximity to the 1990 and 2000 Censuses, the validity of the weights is maximized.

In Tables A1-1 and A1-2, the weighted and un-weighted statistics are reported to illustrate the effect of the weighting on the original numbers for 1992 and 2001. Although exploring the many reasons for low return rates in greater depth would be enlightening, a more incisive litmus test is to see how the data from these surveys compare with other national surveys. This will give a better idea about the actual quality of the data than will speculation about the sources of nonresponse.

[Insert Tables A1-1 and A1-2]

Comparison of Questionnaires

An evaluation of representativeness can be informed by a comparison of items between the 1992 and 2001 surveys, as well as with comparisons of items asked from other comparable national surveys during the same time periods. This comparability exists in regards to them all being national surveys, but differences can be found in the

ways that surveys were administered. The 1992 and 2001 surveys were each mail questionnaires, while many of the comparable surveys used face-to-face interviews. The particular surveys that we compare the 1992 and 2001 surveys with are from the Gallup Organization, the Roper Organization, the Center for Political Studies, the National Opinion Research Center, Public Opinion Quarterly, The Congressional Quarterly (Statistical Abstract of the United States 2001), the Federal Elections Committee, the Institute for Democracy and Electoral Assistance (IDEA), the Decennial Census, and the Current Population Survey and Reports.

The comparison items and data appearing in the following tables cover marital status, previous work or residence on a farm, type of place where one grew up, church attendance, political party preference, liberal-conservative political ideology, voter turnout for presidential elections, and miscellaneous selected items.

Marital Status and Place of Residence

One of the largest differences between the weighted 1992 and 2001 surveys is for marital status, as shown in Table A1-3. The same question wording was used in each. Unlike most items on background characteristics, there is a fairly large gap between their results. The 1992 survey shows 62 percent, while the 2001 survey reports a lower 55 percent for a decrease of 7 percent over a 9 year period.

[Insert Table A1-3]

The finding from the 1992 survey of 62 percent married is extremely close to the 1992 Roper result of 60 percent. In 1991, however, the NORC reports only 53 percent, 9 points below our 1992 survey mark. In 2001, our survey finds 55 percent married, which is only 1 percent lower than the 2000 Census parameter of 56 percent. The NORC is also

56 percent, while the Gallup poll finds a much lower 47 percent and the Current Population Survey for 2001 has a slightly higher 60 percent married.

While marital status item wordings vary somewhat by survey, questions on marital status are fairly straightforward and should not be ambiguous—especially to those who are currently married. Standard types of response categories include married, single or never married, divorced, widowed, or separated. The Gallup interview question included a "Don't know" category, and the NORC includes a "No answer" response. The Roper item allowed for those "Married or living as married," which helps account for the higher percentage found by Roper than by the other interview surveys. Had the "Living together" respondents in the 1986 and 1992 mail surveys been included with the marrieds, it would have pushed the 1986 total from 53 to 57 percent, the 1992 total from 62 to 65 percent, and the 2001 total from 55 to 60 percent. Still, judging from other surveys' estimates, the 1992 sample may overrepresent married people, while the 2001 survey seems to be in the middle of the estimates given by other surveys.

Unlike some characteristics, survey data on marital status can be checked against population parameter data in decennial U.S. Census. Accordingly, 62 percent were married in 1990, and 56 % were married in 2000.

Therefore, marital status items produce a range of percentages although item wording may have little to do with this. Rather, it seems likely that other kinds of distinctions among the surveys—sampling, for example—may be to blame. Relating clusters of surveys to each other around the 1986 and 1992 time frames shows that a survey that is close to the national parameter at one time may be considerably off the next. The 2001 sample was taken near the time of the 2000 Census. The Census'

Current Population Reports provide a timelier, but less accurate picture of the percent married in the U.S.

In any event, the 62 percent figure in our 1992 survey is quite accurate, as close as the Roper survey, and 7 points closer than the 1991 NORC, unweighted sample's 53 percent. The 2001 survey is also quite accurate, 8 points closer than Gallup, 3 points closer than the Current Population Survey, but not as accurate as NORC, which is the same as the Census parameter.

The 1992 survey shows 20 percent who grew up or spent most of their childhood on a farm or ranch. In 2001, that number dips down to 17 percent. Corresponding to this, the 1992 NORC showed 17 percent and the 2000 NORC showed 18 percent. Despite wording differences of the two questionnaires, these are very close estimates.

This is likewise the case for those who grew up in the country apart from farms. There were 12 percent for each of the 1990s surveys, and a larger gap of 16 percent and 11 percent for the 2001 surveys. At the other end of the spectrum, 14 and 16 percent of the 1992 sample said they grew up in a large city of one-half million or more. Fourteen percent of the 1991 NORC sample reported living in a city of one-quarter million or more when they were 16 years old. The 2001 survey found that 17 percent lived in a city as compared to the 2000 NORC, which found that 16 percent lived in the city.

Church Attendance

As Table A1-4 shows, 23 percent of the 1992 survey said they never attended religious services during the past year as did 30 percent in 2001. Twenty-two percent of the 1991 NORC sample said they attended never or less than once a year. In 2000, that number was found to be a higher 36 percent. Attending once or more per week was

reported by 38, 39 and 33 percent of our survey respondents as compared to attendance nearly every week or more by 35 percent of the NORC sample.

[Insert Table A1-4 here]

Identification with Political Parties

Another way of relating the mail survey results to other national data is to look at political party preferences. In the 1992 sample at hand, 48 percent considered themselves to be Democrats whereas 33 percent identified as Republicans and 20 percent considered themselves something else. In the 2001 survey, 41 percent claimed to be Democrats, 31 percent Republicans, and 25 percent Independent/Other. This primarily reflects a movement of Democrats into the Independent/Other category for the 2000 presidential election.

[Insert Table A1-5 here]

The 1992 alliances also compare closely with those found by other national data from the University of Michigan's Center for Political Studies (U.S. Bureau of the Census 1994: 286). In 1990, they report, 50 identified themselves to be strong, weak, or independent Democrats; similarly, 37 percent identified as Republicans. Thirteen percent were either independent of either party or were apolitical. The 1991 NORC survey also corresponds closely. It had 45 percent who were either "Strong Democrat," "Not very strong Democrat," or "Independent, close to Democrat." Corresponding Republicans amounted to 42 percent, and independents and others summed to 13 percent. The Roper results showed a greater range than the other studies, with the lowest percentages of Democrats and Republicans—36 and 28 percent—and the highest share of independents and others at 36 percent.

The 2001 comparisons also look fairly similar. While the S276 survey is close to the NORC, the Gallup poll finds a much lower percentage of Democrats. On the other hand, Gallup finds a higher percentage of Republicans than either the NORC or S276 surveys. The S276 survey finds a lower 25 percent of people identifying with the Independent/Other category, as compared with the Gallup Organization and NORC, who had similarly higher reported findings at 34 and 36 percent.

Overall, the 1992 survey also compares well with the Center and NORC estimates of Democrats, and is about midway between the Roper and other survey figures for Republicans and independent/others. For 2001, the Democrat category was higher than the comparison surveys, while the Republican category fell in the middle, and the Independent/Other category was lower.

Political Ideology

In terms of political ideology, displayed in Table A1-6, the 1992 survey figures are within 2 points in each category with 34, 52, and 14 percent respectively. The 2001 survey figures show the biggest changes to be in the conservative (28 percent) and middle (57 percent) categories, while the liberal category remained within a point at 15 percent.

[Insert Table A1-6 here]

The 1992 Roper question asked, "Thinking politically and socially, how would you describe your own general outlook—as being very conservative, moderately conservative, middle-of-the-road, moderately liberal, or very liberal." Categorized, this sample was 44 percent conservatives, 36 percent middles, and 20 percent liberals. The 2001 Gallup Poll asked, “How would you describe your political views – [Form A:] very conservative, conservative, moderate, liberal, or very liberal; [Form B:] very liberal,

liberal, moderate, conservative, very conservative?" As such, it has similar findings to the 1992 Roper results with 40 percent conservative, 34 percent middle-of-the-road, and 18 percent liberal. The differences in wordings of the ideology items used in these studies are quite obvious. The 1992 and 2001 surveys, in addition to the corresponding NORC surveys and the 2001 Gallup item all target political beliefs in particular. The Roper survey dealt with political and social outlooks.

Wording emphases aside, the 1992 and 2001 survey responses on political beliefs are quite consistent with each other. This probably reflects their sharing an identical item as well as sampling techniques, weighting techniques, and use of mail questionnaires for data collection. The 1992 results also correspond with the conservative category's percentages in the other studies. However, the 1992 mail surveys find fewer liberals and more middle-of-the-roaders than do the interview surveys. In 2001, a greater percentage of people identify themselves as being more middle-of-the-road than had previously been the case, while the percentage of conservatives decreased and the percentage of liberals remained about the same. Similarly, Gallup, NORC, and Roper show appreciable variation among their reports of conservatives and liberals. Polls often reflect marked shifts on weekly bases, since individual political stands are such a pliable issue. This may account for the greater variability between and among the various surveys here.

Voting Behavior

The percentage who said they voted in the last election for the S246 and S276 surveys is the most troubling of all these comparisons, as shown in Table A1-7. The reason for this is the consistent over-representation of people who voted. In 1992, 78 percent reporting that they voted in the 1988 election. The FEC reported that only 50

percent voted, which was also found by IDEA. Again, the Current Population Survey came in at a slightly higher 57 percent. In 2001, 76 percent reported that they had voted in the 2000 presidential election. This is high when compared with the FEC parameter of 51 percent. IDEA reported a lower 49 percent, while the Current Population Survey and the Congressional Quarterly reported a higher 55 percent. The implication of this could mean that people who fill out mail surveys are more likely to vote, but further research would be needed to confirm this possibility.

[Insert Table A1-7 here]

Miscellaneous Selected Items

A number of items from the most recent survey—the 2001 S276 survey—were chosen for their comparability with other national survey findings, and shown in Table A1-8. The Census' Current Population Survey found that 42 percent of the population had access to the internet as compared with the S276 Survey finding of 44 percent. For global warming, a Gallup Monthly Poll found that 85 percent of the population viewed it as a problem, as compared to 76 percent in the S276 Survey. Labor union membership is measured by both the NORC-GSS (12 percent) and the 2001 Current Population Survey (14 percent). The S276 finding of 19 percent is slightly higher than the other two surveys on this item.

[Insert Table A1-8 here]

Finally, attitudes towards labeling genetically modified foods have been assessed by several studies of late. Starting with the earliest, Yankelovich found that 82 percent wanted labeling. In 1999, Pew found that 84 percent favored labeling. And in 2000, Harris found that 86 percent wished to see the labeling of genetically modified foods.

The 2001 survey, at 92 percent, is the most recent of the surveys for this item, and it is also the highest reported finding. This may show a growing trend towards favoring the labeling of genetically modified foods, since the percent in favor increases with each chronologically ordered survey finding.

Summary

In the preceding comparison of surveys, it was shown that the 1992 and 2001 surveys compare closely with other national surveys. This is not to say that comparability across surveys ensures accuracy. It could be the case that each of the surveys is consistently biased. There is, unfortunately, no way to know for sure, as most of the items of interest lack a population parameter with which to compare.

For the differences that do exist across surveys, there is likewise no sure way to identify the most accurate. The logic of sampling theory suggest that the more surveys that are given, the closer the average statistic will approximate the true population parameter. Each individual questionnaire item will most likely have some sampling error. Other minor differences can be due to wording differences among the items, the location of the item in the context of the instrument, and the order of items. As mentioned before, some differences could be due to the use of different methods in terms of mail questionnaires versus face-to-face and phone interviews. Finally, some differences are reflective of true changes over time.

Hence, the consistency observed on a variety of items across surveys, suggests that there is a solid basis for confidence in the reliability and validity of the items. In addition to the cross-survey reliability found here the 1992 and 2001 surveys appear reasonably valid for generalizing to the public they were designed to represent.

APPENDIX 2

SURVEY QUESTIONNAIRE ITEMS

Structure items:

1. Large farms get too many government benefits. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

2. Family farms should be supported even if it means higher food prices. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

3. Government policies should help corporate, non-family farms. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

4. Government policies should focus on helping small farms. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

5. Government policies should focus on helping large farms (in 1992: "be more efficient"). (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

6. Government policies should focus on helping family owner-operated farms. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

Technology items:

1. Do you consider foods with each of the following preparations or treatments as very safe, safe, unsafe, very unsafe, or are you undecided? Food treated with radiation. (1-Very Safe, 2-Safe, 3-Undecided, 4-Unsafe, 5-Very Unsafe)

2. Do you consider foods with each of the following preparations or treatments as very safe, safe, unsafe, very unsafe, or are you undecided? Meat from animals given antibiotics at approved levels. (1-Very Safe, 2-Safe, 3-Undecided, 4-Unsafe, 5-Very Unsafe)

3. Do you consider foods with each of the following preparations or treatments as very safe, safe, unsafe, very unsafe, or are you undecided? Meat from animals given hormones at approved levels. (1-Very Safe, 2-Safe, 3-Undecided, 4-Unsafe, 5-Very Unsafe)

4. I would be willing to pay more for food produced without using chemicals. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

5. The government has adequate regulations for the use of pesticides and other chemicals on food crops. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

6. American farmers use more chemicals than are necessary to produce food. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

Independent Variables:

1. How much do you worry about health problems due to farming methods in the U.S.? (1-A lot, 2-Some, 3-Not Much, 4-Not at All)

2. How much do you worry about environmental problems due to farming methods in the U.S.? (1-A lot, 2-Some, 3-Not Much, 4-Not at All)

3. To protect the environment, we must change the way we produce our nation's food. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

4. I would be willing to pay more for food if it meant that it could be produced in ways that protect the environment. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

5. Good farmland should be protected from other land uses. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

6. Agriculture is the most basic occupation in our society and almost all other occupations depend on it. (1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly Disagree)

7. 2001: Who do you trust for knowledge about the safety of foods you eat? Elected officials; 1992: Please rate each of the following information sources according to how much you trust what they say is true about the impact of agricultural chemicals on the environment: Elected Officials. (1-Trust A Lot, 2-Trust Some, 3-Don't Trust)

8. 2001: Who do you trust for knowledge about the safety of foods you eat? University Professors; 1992: Please rate each of the following information sources according to how much you trust what they say is true about the impact of agricultural chemicals on the environment: University Professors. (1-Trust A Lot, 2-Trust Some, 3-Don't Trust)

9. 2001: Who do you trust for knowledge about the safety of foods you eat? Business Executives; 1992: Please rate each of the following information sources according to how much you trust what they say is true about the impact of

agricultural chemicals on the environment: Business Managers. (1-Trust A Lot, 2-Trust Some, 3-Don't Trust)

10. Do you currently own or run a farm/ranch? (1-Yes, 2-No)

11. 2001: Do any of your close friends/relatives run or own a farm/ranch?;
    1992: Did your parents ever own a farm or ranch?, Do any of your close friends own or run a farm or ranch? (1-Yes, 2-No)

12. Please indicate the kind of place in which you grew up (spent most of your childhood) and where you live now. **Grew up**. (1-A Large Metropolitan City, 2-A Medium city, 3-A Smaller City, 4-A Town or Village, 5-In the country, outside of town (not on a farm or ranch, 6-On a farm or ranch)

13. Please indicate the kind of place in which you grew up (spent most of your childhood) and where you live now. **Live now** (1-A Large Metropolitan City, 2-A Medium city, 3-A Smaller City, 4-A Town or Village, 5-In the country, outside of town (not on a farm or ranch, 6-On a farm or ranch)

14. 2001: Are you: 1-Male 2-Female; 1992: What is your gender? Please circle the number (1-Male, 2-Female).

15. 2001: In what year were you born? ____ ; 1992: What is your age? ____

16. What is your race? (2001: 1-Black, 2-White, 3-Asian or Pacific Islander, 4-American Indian, or 5-Other; 1992: 1-Black, 2-White, 3-Asian or Pacific Islander, 4-Native American, or 5-Other)

17. Which of these best describes your usual stand on political issues? (1-Liberal, 2-Middle-of-the-Road, 3-Conservative)

18. 2001: What is the highest level of education that you have completed? (1-Less than High School, 2-High School Graduate, 3-Technical or Associate Degree, 4-Some College, 5-College Graduate, 6-Completed Post-graduate Degree); 1992: What is your education? (1-Less than High School, 2-Some High School, 3- High School Graduate, 4-Some College, 5-College Graduate, 6-Completed Post-graduate Degree)

19. Which of the following categories comes closest to your annual family income, before taxes? (2001: 1-Under $5000, 2-$10,000 to $14,999, 3-$15,000 to $24,999, 4-$24,000 to $34,999, 5-$35,000 to $49,999, 6-$50,000 to $74,999, 7-$75,000 or more; 1992: 1-Under $10,000, 2-$5,000 to $9,999, 3-$10,000 to $14,999, 4-$15,000 to $19,999, 5-$20,000 to $24,999, 6-$25,000 to $34,999, 7-$35,000 to $49,999, 8-$50,000 to $74,999, 9-$75,000 or More)

Table 2-1. Trends in Farm Population and Off-Farm Income Sources

Year	Farm Population (Millions)	Off-Farm Income (%)
1950	23.1	31
1960	15.6	43
1970	9.7	55
1980	7.2	61
1992	4.6	72
1997	1.8	90

Source: Lobao and Meyer (2001)

Table 2-2. Trends in the Number of Farms and Acres of Farmland

Year	Farms	Acres (1000s)
1910	6,361,502	878,798
1920	6,448,343	955,884
1930	6,288,648	986,771
1940	6,096,799	1,060,852
1950	5,382,162	1,158,566
1960	3,962,520	1,175,646
1970	2,954,200	1,102,769
1980	2,432,510	1,038,855
1990	2,140,420	987,420
2002	2,067,379	879,994

Source: 1910 – 1990 (Lyson 2004: 21); 2002 (Census of Agriculture, USDA 2002)

Table 2-3. Number of Horses, Mules and Tractors

Year	Horses and Mules	Tractors
1900	21,531,635	-----
1910	24,042,882	-----
1920	25,199,552	246,083
1930	18,885,856	920,021
1940	13,931,531	1,567,430
1950	7,603,910	3,251,119
1959	2,955,256	4,489,286
1969	2,304,109	4,618,672
1982	2,288,221	4,523,849
1992	2,117,214	4,304,906
1997	2,527,865	3,936,014

Source: National Agricultural Statistical Service, USDA (1997a)

Table 2-4. Trends in Pesticide Use (Millions of Pounds of Active Ingredients)

Year	Insecticides	Herbicides	Fungicides	Other	Total
1964	123.3	48.2	22.2	21.4	215
1966	119.2	79.4	23.2	18.7	240.6
1971	127.7	175.7	29.3	31.7	364.4
1976	131.7	341.4	26.6	30.7	530.5
1982	82.7	430.3	25.2	34.2	572.4
1990	57.4	344.6	27.8	67.9	497.7
1997	60.5	366.4	50.5	110.2	587.6

Source: Economic Research Service, USDA (2000: 6)

Table 2-5. Outputs, Inputs and Productivity in Agriculture (Index, 1987=1.0)

Year	Output	Input	Productivity
1950	0.503	1.094	0.460
1955	0.563	1.111	0.507
1960	0.620	1.122	0.553
1965	0.672	1.074	0.625
1970	0.719	1.070	0.672
1975	0.803	1.067	0.752
1980	0.900	1.181	0.762
1985	1.015	1.054	0.962
1990	1.065	1.000	1.065
1995	1.153	1.038	1.111

Source: National Agricultural Statistical Service, USDA (1997)

Table 2-6. Price Index Ratio

Year	Received/Paid
1910	1.020
1920	0.876
1930	0.828
1940	0.806
1950	1.008
1960	0.797
1970	0.717
1980	0.638
1990	0.504
1997	0.435

Source: National Agricultural Statistical Service, USDA (1997a)

Table 2-7. Disposable Income Spent on Food

Year	Total Disposable Income (Billion dollars)	Total Expenditure on Food (Billion dollars)	Percent
1930	74.7	18.1	24.2
1940	76.8	15.9	20.7
1950	210.1	43.3	20.6
1960	365.4	64.0	17.5
1970	735.7	102.0	13.9
1980	2009.0	266.0	13.2
1990	4285.8	480.3	11.2
2000	7194.0	724.0	10.1

Source: Economic Research Service, USDA (2004)

Table 3-1. Key Elements of the Competing Agricultural Paradigms

Conventional agriculture	Alternative agriculture
Centralization	**Decentralization**
• National/international production, processing, and marketing • Concentrated populations; fewer farmers • Concentrated control of land, resources and capital	• More local/regional production, processing, and marketing • Dispersed population; more farmers • Dispersed control of land, resources and capital
Dependence	**Independence**
• Large, capital-intensive production units and technology • Heavy reliance on external sources of energy, inputs, and credit • Consumerism and dependence on the market • Primary emphasis on science, specialists and experts	• Smaller, low-capital production units and technology • Reduced reliance on external source of energy, inputs, and credit • More personal and community self-sufficiency • Primary emphasis on personal knowledge, skills, and local wisdom
Competition	**Community**
• Lack of cooperation; self-interest • Farm traditions and rural culture outdated • Small rural communities not necessary to agriculture • Farm work a drudgery; labor an input to be minimized • Farming is a business only • Primary emphasis on speed, quality, and profit	• Increased cooperation • Preservation of farm traditions and rural culture • Small rural communities essential to agriculture • Farm work rewarding; labor an essential to be made meaningful • Farming is a way of life as well as a business • Primary emphasis on permanence, quality, and beauty

Note: Continued on next page.
Source: Beus and Dunlap (1990: 598-599)

Table 3-1. (continued)

Conventional agriculture	Alternative agriculture
Domination of Nature • Humans are separate from and superior to nature • Nature consists primarily of resources to be used • Life-cycle incomplete; decay (recycling wastes) neglected • Human-made systems imposed on nature • Production maintained by agricultural chemicals • Highly processed, nutrient-fortified food	**Harmony with Nature** • Humans are part of and subject to nature • Nature is valued primarily for its own sake • Life-cycle complete; growth and decay balanced • Natural ecosystems are imitated • Production maintained by development of healthy soil • Minimally processed, naturally nutritious food
Specialization • Narrow genetic base • Most plants grown in monocultures • Single-cropping in succession • Separation of crops and livestock • Standardized production systems • Highly specialized, reductionistic science and technology	**Diversity** • Broad genetic base • More plants grown in polycultures • Multiple crops in complementary rotations • Integration of crops and livestock • Locally adapted production systems • Interdisciplinary, systems-oriented science and technology
Exploitation • External costs often ignored • Short-term benefits outweigh long-term consequences • Based on heavy use of nonrenewable resources • Great confidence in science and technology • High consumption to maintain economic growth • Financial success; busy lifestyles; materialism	**Restraint** • All external costs must be considered • Short-term and long-term outcomes equally important • Based on renewable resources; nonrenewable resources conserved • Limited confidence in science and technology • Consumption restrained to benefit future generations • Self-discovery; simpler lifestyles; nonmaterialism

Note: Continued from previous page.
Source: Beus and Dunlap (1990: 598-599)

Table 3-2. The ACAP Survey Instrument

A.	Meeting U.S. food needs with fewer and fewer farmers is a positive outcome of technological progress.	…..1 2 3 4 5…..	Meeting U.S. food needs with fewer and fewer farmers is a negative outcome of our free market.
B.	Farmland should be farmed so as to protect the long-term productive capacity of the land, even if this means lower production and profits.	…..1 2 3 4 5…..	Farmland should be farmed so as to maximize annual profits, even if this threatens the long-term productive capacity of the land.
C.	High energy ue makes U.S. agriculture vulnerable and should be greatly reduced.	…..1 2 3 4 5…..	Large inputs of energy into agriculture should be continued as long as it is profitable to do so.
D.	The primary goal of farmers should be to maximize the productivity, efficiency and profitability of their farms.	…..1 2 3 4 5…..	The primary goal of farmers should be to improve the quality of their products and to enhance the longterm condition of their farms.
E.	The amount of farmland owned by an individual or coporation should NOT be limited, even if the ownership of land becomes much more concentrated than at present.	…..1 2 3 4 5…..	The amount of farmland owned by an individual or corporation should be limited in order to encourage land ownership by as many people as possible.
F.	Agricultural scientists and policy-makers should recognize that there are limits to what nature can provide and adjust their expectations accordingly.	…..1 2 3 4 5…..	Agricultural scientists and policy-makers should expand efforts to develop biotechnologies and other innovations in order to increase food supplies.
G.	Good farming depends mainly on personal experience and knowledge of the land.	…..1 2 3 4 5…..	Good farming depends mainly on applying the findings of modern agricultural science.
H.	The future success of American agriculture will NOT be affected if rural communities continue to decline.	…..1 2 3 4 5…..	Health rural communities are absolutely essential for American agriculture's future success.
I.	Small to medium-sized farms can best serve American's agricultural needs.	…..1 2 3 4 5…..	Large to very large farms can best serve America's agricultural needs.
J.	Farm traditions and culture are outdated and of little use in modern agriculture.	…..1 2 3 4 5…..	Farm traditions and culture help; maintain respect for the land and are essential for good farming
K.	Farming is first and foremost a business like any other.	…..1 2 3 4 5…..	Farming is first of all a way of life and second of all a business.
L.	Farmers should use primarily natural fertilizers and production methods such as manure, crop rotations, composts and biological pest control.	…..1 2 3 4 5…..	Farmers sould use primarily synthetic fertilizers and pesticides in order to maintain adequate levels of production

Note: Continued on next page.
Source: Beus and Dunlap (1991:439-441)

Table 3-2. (continued)

M.	Most people should live in cities and leave farming to those who do it best.	…..1 2 3 4 5…..	Many more people should live on farms and in rural areas than do so at present.
N.	Modern agriculture is a major cause of ecological problems and must be greatly modified to become ecologically sound.	…..1 2 3 4 5…..	Modern agriculture is a minor cause of ecological prolbmes and needs to be only fine-tuned periodically in order to be ecologically sound.
O.	Farmers should farm only as much land as they can personally care for.	…..1 2 3 4 5…..	Farmers should farm as much land as they profitably can.
P.	Farms should be specialized in one or at most a few crops	…..1 2 3 4 5…..	Farms should be diversified and include a large variety of crops.
Q.	Soil and water are the sources of all life and should therefore be strictly conserved.	…..1 2 3 4 5…..	Soil and water are the basic factors of production and should be used so as to maximize production.
R.	Farmers should purchase most of the goods and services just as other consumers do.	…..1 2 3 4 5…..	Farmers should produce as many of their own goods and services as possible.
S.	The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.	…..1 2 3 4 5…..	The key to agriculture's future success lies in the continued development of advanced technologies that will overcome nature's limits.
T.	Most farms should specialize in either crops or livestock.	…..1 2 3 4 5…..	Most farms should include both crops and livestock.
U.	Production, processing, and marketing of agricultural products is best done at local and regional levels.	…..1 2 3 4 5…..	Production, processing, and marketing of agricultural products is best done at national and international levels.
V.	The successful farmer is one who earns enough from faring to enjoy an above average standard of living.	…..1 2 3 4 5…..	The successful farmer is one who truly enjoys farming even if it provides only a below average standard of living.
W.	Technology should be used to make farm labor more rewarding and enjoyable, but not to replace it.	…..1 2 3 4 5…..	Farm labor should be replaced whenever possible by more efficient machines and other technologies.
X.	The abundance and relatively low prices of food in the United States are evidence that American agriculture is the most successful in the world.	…..1 2 3 4 5…..	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.

Note: Continued from previous page.
Source: Beus and Dunlap (1991:439-441)

Table 4-1. Summary of Hypothesized Relationship between Variables and Support for Conventional and Alternative Structure and Technology

	Predicted Relationship with…				
Variable	Conventional Technology	Alternative Technology	Conventional Structure	Alternative Structure	Rationale
Trust of Business Managers	Positive	Negative	Positive	Negative	Trust of Network
Trust of Elected Officials	Positive	Negative	Positive	Negative	Trust of Network
Trust of University Professors	Positive	Negative	Positive	Negative	Trust of Network
Owning a Farm	Positive	Negative	Negative	Positive	Personal Perception
Friends/Relatives Own a Farm	Positive	Negative	Negative	Positive	Personal Perception
Familiarity with Farming	Positive	Negative	Negative	Positive	Personal Perception
Grew Up on a Farm	Positive	Negative	Negative	Positive	Personal Perception
Lives on a Farm	Positive	Negative	Negative	Positive	Personal Perception
Grew Up in the Country	Positive	Negative	Negative	Positive	Personal Perception
Live in the Country	Positive	Negative	Negative	Positive	Personal Perception
Political Liberalism	Negative	Positive	Negative	Positive	Pre-existing Ideas; Beus (1995); Tomazic et al. (2002); Tomazic and Katz (2002)
Agrarianism: Land Use	Positive	Negative	Negative	Positive	Pre-existing Ideas
Agrarianism: Occupations	Positive	Negative	Negative	Positive	Pre-existing Ideas; Beus and Dunlap (1994b)
Environmental Concern	Negative	Positive	Negative	Positive	Pre-existing Ideas Sharp and Tucker (2005)
Health Concern	Negative	Positive	Negative	Positive	Pre-existing Ideas; Hoban and Clifford (1994); Molnar et al. (2002)

Table 4-1. (continued)

Variable	Predicted Relationship with… Conventional Technology	Alternative Technology	Conventional Structure	Alternative Structure	Rationale
Gender (Female)	Negative	Positive	Negative	Positive	Beus (1995); Tomazic et al. (2002); Tomazic and Katz (2002)
Race (Nonwhite)	Negative	Support	Negative	Positive	Beus (1995); Tomazic et al. (2002); Tomazic and Katz (2002)
Age	Positive	Negative	Negative	Positive	Beus (1995)
Education	Positive	Negative	Positive	Negative	Beus (1995); Tomazic et al (2002)
Income	Positive	Negative	Positive	Negative	Tomazic et al. (2002)
Region of the Country	Difference (No direction)	Difference (No direction)	Difference (No direction)	Difference (No direction)	Control Variable

Table 5-1. Descriptive Statistics of Individual Factor Analysis Items

		1992	2001
Large farms do not get too many government benefits (reflected).	Mean	2.3778	2.6909
	Median	2.0000	3.0000
	St. Dev.	1.0452	.98796
Family farms should be supported even if it means higher food prices.	Mean	3.2349	3.5276
	Median	3.0000	4.0000
	St. Dev.	1.0877	.98770
Government policies should help corporate, non-family farms.	Mean	2.4546	2.6812
	Median	2.0000	3.0000
	St. Dev.	1.0192	1.04611
Government policies should focus on helping small farms.	Mean	3.6621	3.8518
	Median	4.0000	4.0000
	St. Dev.	1.0267	.86378
Government policies should focus on helping large farms (1992: be more efficient).	Mean	3.1579	2.9091
	Median	3.0000	3.0000
	St. Dev.	1.0510	1.00601
Government policies should focus on helping family owner-operated farms.	Mean	3.6578	3.8119
	Median	4.0000	4.0000
	St. Dev.	1.0041	.83983
Food safety: foods that have been treated with radiation.	Mean	2.4661	2.3940
	Median	2.0000	2.0000
	St. Dev.	0.9657	1.06190
Food safety: meat from animals that have been given antibiotics.	Mean	3.0884	2.9209
	Median	3.0000	3.0000
	St. Dev.	0.9524	1.09181
Food safety: meat from animals that have been given hormones.	Mean	2.8476	2.6370
	Median	3.0000	3.0000
	St. Dev.	0.9331	1.02307
The government does not have adequate regulations for the use of pesticides and other chemicals on food crops (reflected).	Mean	3.1461	2.9234
	Median	3.0000	3.0000
	St. Dev.	0.9759	.92242
I would be willing to pay more for food produced without using chemicals.	Mean	3.5907	3.5816
	Median	4.0000	4.0000
	St. Dev.	0.9662	1.02986
American farmers use more chemicals than are necessary to produce food.	Mean	3.4222	3.3683
	Median	3.0000	3.0000
	St. Dev.	0.8631	.87636

Note: 1992 (n=2866) and 2001 (n=819) weighted data; The response to the above items are 1-Strongly Disagree, 2-Disagree, 3-Undecided, 4-Agree, and 5-Strongly Agree.

Table 5-2. Correlation Matrix of 1992 Dependent Variable Items

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
Large farms do not get too many government benefits (reflected) (Y1)	1											
Family farms should be supported even if it means higher food prices (Y2)	.104	1										
Government policies should help corporate, non-family farms (Y3)	.295	.128	1									
Government policies should focus on helping small farms (Y4)	.067	.381	.163	1								
Government policies should focus on helping large farms be more efficient (Y5)	.288	.156	.345	.206	1							
Government policies should focus on helping family owner-operated farms (Y6)	.117	.417	.116	.683	.323	1						
The government does not have adequate regulations for the use of pesticides and other chemicals on food crops (reflected) (Y7)	.016	.084	-.052	.065	-.006	.031	1					
Food safety: foods that have been treated with radiation (Y8)	-.169	-.005	-.095	-.093	-.089	-.076	-.189	1				
Food safety: meat from animals that have been given antibiotics (Y9)	-.021	.056	.006	-.057	.048	-.022	-.267	.425	1			
Food safety: meat from animals that have been given hormones (Y10)	-.027	.033	.041	-.044	.037	-.075	-.367	.395	.688	1		
I would be willing to pay more for food produced without using chemicals (Y11)	-.013	.202	.020	.097	.091	.120	.357	-.267	-.270	-.343	1	
American farmers use more chemicals than are necessary to produce food (Y12)	-.142	.032	-.004	.011	.008	.015	.325	-.172	-.204	-.253	.372	1

Note: 1992 weighted data (n=2866); two-sided statistical significance shown below correlation

Table 5-3. Correlation Matrix of 2001 Dependent Variable Items

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
Large farms do not get too many government benefits (reflected) (Y1)	1											
Family farms should be supported even if it means higher food prices (Y2)	-.066	1										
Government policies should help corporate, non-family farms (Y3)	.199	.007	1									
Government policies should focus on helping small farms (Y4)	-.023	.447	-.012	1								
Government policies should focus on helping large farms (Y5)	.269	-.005	.441	.222	1							
Government policies should focus on helping family owner-operated farms (Y6)	-.020	.452	-.044	.707	.096	1						
The government does not have adequate regulations for the use of pesticides and other chemicals on food crops (reflected) (Y7)	-.059	-.162	-.005	-.168	-.058	-.173	1					
Food safety: foods that have been treated with radiation (Y8)	.053	-.179	.049	-.152	.053	-.071	.422	1				
Food safety: meat from animals that have been given antibiotics (Y9)	.148	-.237	.092	-.202	.024	-.122	.428	.748	1			
Food safety: meat from animals that have been given hormones (Y10)	.030	.102	.009	.197	.051	.095	-.324	-.349	-.277	1		
I would be willing to pay more for food produced without using chemicals (Y11)	-.106	.137	-.187	.122	-.154	.146	-.202	-.274	-.327	.345	1	
American farmers use more chemicals than are necessary to produce food (Y12)	-.155	.069	-.049	.095	-.053	.062	-.210	-.229	-.265	.402	.409	1

Note: 2001 weighted data (n=819); two-sided statistical significance shown below correlation

Table 5-4. Rotated Factor Loadings from Principal Axis Factoring

	1992 CS	1992 AS	1992 CT	1992 AT	2001 CS	2001 AS	2001 CT	2001 AT
Large farms [do not] get too many government benefits	.566				.376			
Government policies should help corporate, non-family farms	.571				.574			
Government policies should focus on helping large farms (1992: be more efficient)	.534				.747			
Family farms should be supported even if it means higher food prices		.446				.519		
Government policies should focus on helping small farms		.795				.830		
Government policies should focus on helping family owner-operated farms		.892				.879		
Food safety: foods that have been treated with radiation			.472				.398	
Food safety: meat from animals that have been given antibiotics			.856				.876	
Food safety: meat from animals that have been given hormones			.773				.879	
I would be willing to pay more for food produced without using chemicals				.686				.630
The government [does not] have adequate regulations for the use of pesticides and other chemicals on food crops				.454				.533
American farmers use more chemicals than are necessary to produce food				.570				.686

Note: 1992 data (n=2,866) and 2001 data (n=819); this rotated solution uses an oblique promax rotation.

Table 5-5. Descriptive Statistics of Dependent Variable Indices

		1992	2001	Difference
Alternative	Mean	3.3863	3.2911	-.0952***
Technology Index	Median	3.3333	3.3333	(t=-3.34)
	St. Dev.	.7049	.7244	
	Reliability (α)	.617	.649	
Conventional	Mean	2.8007	2.6506	-.1501***
Technology Index	Median	3.0000	2.6667	(t=-4.41)
	St. Dev.	.7766	.7720	
	Reliability (α)	.751	.773	
Alternative	Mean	3.5183	3.7304	+0.2121***
Structure Index	Median	3.6667	4.0000	(t=6.98)
	St. Dev.	.84432	.74280	
	Reliability (α)	.741	.767	
Conventional	Mean	2.6634	2.7604	+0.097***
Structure Index	Median	2.6667	2.6667	(t=3.28)
	St. Dev.	.7627	.7421	
	Reliability (α)	.573	.567	

Table 5-6. Correlations of Dependent Variables with Individual Items

	1992 AT	1992 CT	1992 AS	1992 CS	2001 AT	2001 CT	2001 AS	2001 CS
Pay more for food without chemicals	.773				.783			
Government does not have adequate regulations for chemicals	.757				.753			
American farmers use more chemicals	.728				.767			
Food safety: radiation		.747				.744		
Food safety: antibiotics		.861				.875		
Food safety: hormones		.846				.871		
Family farms, higher food prices			.749				.787	
Government, focus on helping small farms			.840				.852	
Government, family owner-operated farms			.852				.851	
Government, corporate, non-family farms				.739				.758
Government, large farms				.745				.778
Large farms do not get too many government benefits				.720				.659

Note: Pearson's r coefficients are reported.

Table 5-7. Correlation Matrices of Dependent Variables, 1992 and 2001

	1992 AT	1992 CT	1992 AS	1992 CS
1992 Alternative Technology Index	1			
1992 Conventional Technology Index	-.423**	1		
1992 Alternative Structure Index	.124**	-.045*	1	
1992 Conventional Structure Index	-.014	-.051*	.257**	1

	2001 AT	2001 CT	2001 AS	2001 CS
2001 Alternative Technology Index	1			
2001 Conventional Technology Index	-.432**	1		
2001 Alternative Structure Index	.181**	-.239**	1	
2001 Conventional Structure Index	-.114**	.053	.025	1

Table 5-8. Descriptive Statistics of Independent Variables

		1992	2001
Trust of Communication Networks			
Trust Elected Officials (X1)	Mean	1.304	1.342
	Median	1.000	1.000
	St. Dev.	1.105	1.139
Trust University Professors (X2)	Mean	2.613	2.336
	Median	3.000	3.000
	St. Dev.	0.962	1.249
Trust Business Managers (X3)	Mean	1.703	1.198
	Median	2.000	1.000
	St. Dev.	1.027	1.004
Pre-existing Ideas			
Agriculture is the most basic occupation, and all others depend on it (X4)	Mean	2.981	3.200
	Median	3.000	3.000
	St. Dev.	0.854	0.764
Good farmland should be protected from other uses. (X5)	Mean	3.001	2.924
	Median	3.000	3.000
	St. Dev.	0.810	0.818
How much do you worry about health problems due to farming methods in the U.S.? (X6)	Mean	1.486	1.643
	Median	2.000	2.000
	St. Dev.	0.966	1.035
Liberal Political Ideology (X7)	Mean	1.684	1.782
	Median	2.000	2.000
	St. Dev.	0.781	0.748
Environmental Concern Index (X8)	Mean	8.588	8.533
	Median	9.000	9.000
	St. Dev.	2.231	2.186
	Reliability (α)	0.634	0.589
How much do you worry about environmental problems due to farming methods in the U.S.? (ECI index)	Mean	1.576	1.752
	Median	2.000	2.000
	St. Dev.	0.939	0.991
Farming is a major source of pollution in our nation today (ECI index)	Mean	1.634	1.599
	Median	1.000	1.000
	St. Dev.	1.036	1.004
To protect the environment, we must change the way we produce our nation (ECI index)	Mean	2.377	2.183
	Median	2.000	2.000
	St. Dev.	0.958	0.954

Note: 1992 (n=2866) and 2001 (n=819) weighted data.

Table 5-8. (continued)

		1992	2001
Personal Characteristics			
Female (X9)	Percent	55.79%	54.23%
Non-White (X10)	Percent	17.82%	27.41%
	Mean	3.496	3.012
Education (X11)	Median	3.000	3.000
	St. Dev.	1.385	1.632
	Mean	2.814	4.016
Income (X12)	Median	3.000	4.000
	St. Dev.	1.570	2.143
	Mean	49.446	51.071
Age (X13)	Median	48.000	52.000
	St. Dev.	18.024	18.841
Region: South (reference) (X14)	Percent	35.74%	35.51%
Region: Northeast (X15)	Percent	18.38%	17.60%
Region: Midwest (X16)	Percent	23.47%	22.31%
Region: West (X17)	Percent	19.40%	20.86%
Personal Perception			
Grew up on a Farm (X18)	Percent	17.31%	15.95%
Grew up in the Country (not on a farm) (X19)	Percent	11.25%	15.17%
Lives on a Farm (X20)	Percent	4.42%	4.61%
Lives in the Country (not on a farm) (X21)	Percent	9.70%	10.88%
Self-Reported	Mean	2.538	2.106
Familiarity with	Median	2.000	2.000
Agriculture (X22)	St. Dev.	1.200	0.867
Owns a Farm or Ranch (X23)	Percent	6.93%	4.62%
Friend or Relative Owns a Farm or Ranch (X24)	Percent	62.84%	31.08%

Note: 1992 (n=2866) and 2001 (n=819) weighted data

Table 5-9. Correlation Matrix of Independent Variables, 1992

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Trust Officials (X1)	1											
Trust Professors (X2)	.210	1										
Trust Managers (X3)	.383	.257	1									
Agriculture is most basic occupation (X4)	-.020	-.067	-.033	1								
Good farmland protected (X5)	.007	-.027	-.073	.245	1							
How much worry: health problems (X6)	.011	-.104	-.114	.090	.168	1						
Liberal (X7)	-.005	.074	-.092	-.046	.111	.075	1					
Female (X8)	-.081	-.009	-.130	.032	.130	.571	.114	1				
Environmental Concern Index (X9)	.016	-.095	.022	.068	.047	.139	.065	.070	1			
Non-White (X10)	.130	.027	.144	-.093	.012	.128	.065	.030	.079	1		
Education (X11)	-.177	.201	-.113	-.080	-.078	-.138	.162	-.104	-.046	-.127	1	
Income (X12)	-.125	.158	-.016	-.069	-.067	-.084	.005	-.004	-.222	-.079	.471	1

Note: Continued on next page.

Table 5-9. (continued)

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Age (X13)	.140	-.200	.080	.192	.107	.065	-.182	-.039	.087	-.087	-.400	-.312
Region: South (X14)	.065	.072	.084	.058	-.019	.015	-.057	-.032	.027	.111	-.043	-.044
Region: Northeast (X15)	.042	-.010	.029	-.025	.036	-.008	-.057	-.032	-.047	-.082	.035	.070
Region: Midwest (X16)	-.020	-.007	-.001	.028	-.033	-.026	.108	.018	-.021	-.066	-.028	-.069
Region: West (X17)	-.127	-.067	-.132	-.050	.060	.015	.005	-.007	.031	-.017	.056	.054
Grew up on Farm (X18)	.073	-.045	.066	.076	.049	.047	-.131	-.061	.029	.042	-.211	-.137
Grew up in Country (X19)	-.026	.004	-.004	.023	.012	-.022	-.042	-.058	-.055	-.022	-.073	-.007
Lives on Farm (X20)	.081	-.011	.110	.038	-.045	.077	.000	.010	-.041	.080	-.122	-.059
Lives in Country (X21)	.010	-.061	-.022	.028	.036	-.019	-.056	-.062	-.065	-.098	-.051	-.003
Self-Reported Familiarity (X22)	-.056	-.045	-.023	.073	.049	.011	-.095	-.095	-.175	-.043	-.064	-.022
Owns a Farm (X23)	.025	-.003	.018	.006	-.075	-.104	-.074	-.139	-.130	-.019	-.040	.008
Friend/ Relative Owns Farm (X24)	-.004	.033	.044	.003	-.041	-.009	-.149	-.068	-.065	-.020	-.047	-.030

Note: Continued on next page.

Table 5-9. (continued)

	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24
Age (X13)	1											
Region: South (X14)	.050	1										
Region: Northeast (X15)	-.081	-.354	1									
Region: Midwest (X16)	-.002	-.413	-.263	1								
Region: West (X17)	.020	-.366	-.233	-.272	1							
Grew up on Farm (X18)	.202	.056	-.116	.034	.016	1						
Grew up in Country (X19)	.009	.078	-.043	-.023	-.024	-.163	1					
Lives on Farm (X20)	.064	.070	-.072	.070	-.080	.308	-.039	1				
Lives in Country (X21)	-.042	-.005	.008	.009	-.015	.010	.248	-.070	1			
Self-Reported Familiarity (X22)	.115	.024	-.128	.063	.037	.373	.112	.242	.107	1		
Owns a Farm (X23)	.011	.025	-.015	.049	-.062	.274	.003	.458	-.009	.382	1	
Friend/ Relative Owns Farm (X24)	.057	.075	-.248	.029	.102	.329	.047	.160	.082	.416	.161	1

Table 5-10. Correlation Matrix of Independent Variables, 2001

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Trust Executives (X1)	1											
Trust Professors (X2)	.359	1										
Trust Managers (X3)	.547	.281	1									
Agriculture is most basic occupation (X4)	-.054	-.155	-.103	1								
Good farmland protected (X5)	-.026	-.058	-.039	.260	1							
How much worry: health problems (X6)	.003	-.050	-.074	.133	.145	1						
Liberal (X7)	-.039	.138	-.096	-.126	-.057	.081	1					
Environmental Concern Index (X9)	.001	.046	-.031	-.013	.079	.525	.169	1				
Female (X8)	.062	-.116	.032	.088	.130	.077	.007	-.055	1			
Non-White (X10)	.193	.061	.100	-.006	.026	.334	.033	.217	-.001	1		
Education (X11)	.016	.166	-.067	-.085	-.125	-.185	.149	-.031	-.054	-.073	1	
Income (X12)	-.129	.091	-.084	-.129	-.069	-.266	.024	-.144	-.187	-.272	.533	1

Note: Continued on next page.

Table 10. (continued)

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Age (X13)	.026	-.208	.089	.085	.172	-.018	-.178	-.032	.075	-.150	-.313	-.256
Region: South (X14)	-.059	-.022	-.003	-.049	.017	-.027	-.115	-.048	.061	.001	.047	.047
Region: Northeast (X15)	-.013	-.066	-.005	-.009	.037	.136	.096	.070	.038	.008	-.004	-.042
Region: Midwest (X16)	.032	-.001	.069	.028	.047	-.091	.041	-.041	.143	-.199	-.077	.005
Region: West (X17)	.090	.137	-.015	.037	-.120	-.038	.039	.029	-.107	.063	.077	-.004
Grew up on Farm (X18)	.089	.029	.021	.056	.067	-.058	-.116	-.089	.063	.019	-.171	-.083
Grew up in Country (X19)	-.078	-.170	-.098	.042	.053	.080	-.074	.058	.038	.016	-.104	-.103
Lives on Farm (X20)	-.076	-.115	-.087	.064	.035	-.104	-.033	-.080	.022	-.100	-.068	-.030
Lives in Country (X21)	-.058	-.005	-.019	.031	-.029	-.023	.004	-.046	-.129	-.159	-.058	.064
Self-Reported Familiarity (X22)	-.115	-.092	-.111	.196	.014	-.077	-.051	-.034	-.157	-.186	-.016	-.016
Owns a Farm (X23)	-.052	-.033	-.046	.102	.027	-.027	-.045	-.133	.003	-.124	.017	.085
Friend/ Relative Owns Farm (X24)	-.083	-.071	-.041	.143	.053	-.142	-.122	-.126	-.038	-.217	-.027	.060

Note: Continued on next page.

Table 10. (continued)

	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24
Age (X13)	1											
Region: South (X14)	-.041	1										
Region: Northeast (X15)	.068	-.343	1									
Region: Midwest (X16)	.073	-.398	-.248	1								
Region: West (X17)	-.115	-.381	-.237	-.275	1							
Grew up on Farm (X18)	.237	-.028	-.113	.196	-.072	1						
Grew up in Country (X19)	-.039	.119	.095	-.083	-.121	-.184	1					
Lives on Farm (X20)	.107	-.017	-.043	.141	-.065	.270	-.081	1				
Lives in Country (X21)	-.013	.051	-.067	.022	-.029	.118	.119	-.077	1			
Self-Reported Familiarity (X22)	.107	-.072	-.152	.126	.069	.349	-.047	.323	.163	1		
Owns a Farm (X23)	.064	.033	-.047	.055	-.062	.238	-.042	.538	-.015	.336	1	
Friend/ Relative Owns Farm (X24)	.081	-.007	-.126	.173	-.026	.268	.030	.250	.176	.454	.279	1

Table 5-11. Bivariate Correlations of Indices and Independent Variables, 1992

	Conventional Technology	Alternative Technology	Conventional Structure	Alternative Structure
Trust Elected Officials	.056	-.147	.114	.064
Trust University Professors	.095	-.045	.116	.014
Trust Business Managers	.128	-.238	.080	-.019
Ag. is most basic occupation	-.038	.083	-.039	.152
Ag. Land Preservation	-.159	.186	.047	.296
Health Concern	-.404	.456	-.033	.067
Liberal Political Ideology	.013	.127	.024	.107
Environmental Concern	-.314	.549	-.031	.020
Female	-.267	.156	.120	.031
Non-White	-.113	-.021	.100	-.021
Education	.179	.033	-.005	-.043
Income	.107	.031	-.035	-.070
Age	.000	-.110	-.187	.037
Southern Region	-.004	-.081	.076	-.042
Northeast Region	-.041	.071	.053	.012
Midwest Region	.072	-.051	-.056	.090
West Region	-.026	.068	-.080	-.048
Grew up on Farm	-.046	-.080	-.081	.040
Grew up in Country	.014	-.009	.034	.034
Live on Farm	-.013	-.079	-.119	-.003
Live in Country	.035	-.003	-.040	.026
Familiarity with Agriculture	.058	-.099	-.158	.093
Owns Farm	.048	-.158	-.071	.031
Knows Farm Owner	.017	-.089	-.097	-.025

Table 5-12. Bivariate Correlations of Indices and Independent Variables, 2001

	Conventional Technology	Alternative Technology	Conventional Structure	Alternative Structure
Trust Elected Officials	.246	-.051	.218	-.155
Trust University Professors	.197	.033	.041	-.140
Trust Business Managers	.223	-.173	.172	-.089
Ag. is most basic occupation	-.070	.102	-.036	.251
Ag. Land Preservation	-.174	.098	-.059	.322
Health Concern	-.388	.394	.091	.102
Liberal Political Ideology	-.024	.147	-.014	-.004
Environmental Concern	-.261	.391	-.044	.173
Female	-.198	.121	.173	.002
Non-White	-.114	.112	.240	-.033
Education	.166	.030	-.184	-.265
Income	.215	-.155	-.205	-.194
Age	-.035	-.125	-.030	.162
Southern Region	-.006	-.071	-.025	.007
Northeast Region	-.138	.009	.091	.006
Midwest Region	.073	.023	-.182	.074
West Region	.096	.036	.072	-.123
Grew up on Farm	.027	-.151	-.033	.066
Grew up in Country	-.157	.028	.038	.081
Live on Farm	.005	-.099	-.100	.056
Live in Country	.051	-.081	-.099	.024
Familiarity with Agriculture	-.001	-.034	-.199	.163
Owns Farm	.054	-.156	-.025	.011
Knows Farm Owner	.049	-.096	-.098	.157

Table 5-13. Trust and Ideas Models Predicting Alternative Structure

	Trust (1992)		Trust (2001)		Ideas (1992)		Ideas (2001)	
Trust of Network								
Trust Elected Officials	.063 (.082)	***	-.081 (-.124)	**				
Trust Business Managers	-.043 (-.052)	**	.005 (.007)					
Trust University Professors	.009 (.010)		-.065 (-.098)	**				
Pre-existing Ideas								
Ag. is Most Basic Occupation					.088 (.089)	***	.188 (.193)	***
Ag. Land Preservation					.277 (.266)	***	.242 (.266)	***
Health Concern					.030 (.035)		-.043 (-.060)	
Environmental Concern					-.018 (-.046)	*	.063 (.185)	***
Political Liberalism					.091 (.084)	***	.009 (.009)	
Intercept	-.031		.253	***	-1.17	***	-1.711	***
F-score	6.106	***	9.075	***	65.317	***	30.942	***
R^2	.006		.032		.102		.155	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***.

Table 5-14. Perceptions and Personal Models Predicting Alternative Structure

	Perceptions (1992)		Perceptions (2001)		Personal (1992)		Personal (2001)	
Personal Perception								
Grew up on farm	.082		.045					
	(.037)		(.022)					
Grew up in country	.073		.187	**				
	(.027)		(.090)					
Live on farm	-.120		.102					
	(-.029)		(.029)					
Live in country	.033		-.069					
	(.012)		(-.029)					
Familiarity with Agriculture	.082	***	.115	***				
	(.116)		(.134)					
Owns farm	.011		-.289	*				
	(.003)		(-.082)					
Knows farm owner	-.145	***	.173	**				
	(-.083)		(.108)					
Personal Characteristics								
Female					.037		-.067	
(Reference: Male)					(.022)		(-.045)	
Nonwhite					-.036		-.094	
(Reference: White)					(-.016)		(-.056)	
Age					.001		.002	
					(.017)		(.059)	
Educ.					-.005		-.086	***
					(-.009)		(-.189)	
Income					-.028	*	-.036	**
					(-.053)		(-.104)	
Northeast					.085	*	-.041	
(Reference: South)					(.039)		(-.021)	
Midwest					.185	***	.031	
(Reference: South)					(.093)		(.018)	
West					-.026		-.190	**
(Reference: South)					(-.012)		(-.104)	
Intercept	-.137	***	-.315	***	-.010		.386	***
F-score	6.555	***	5.789	***	5.508	***	10.708	***
R^2	.016		.048		.015		.096	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-15. Trust and Ideas Models Predicting Conventional Structure

	Trust (1992)		Trust (2001)		Ideas (1992)		Ideas (2001)	
Trust of Network								
Trust Elected Officials	.060 (.086)	***	.124 (.191)	***				
Trust Business Managers	.017 (.023)		.061 (.082)	*				
Trust University Professors	.073 (.092)	***	-.034 (-.051)					
Pre-existing Ideas								
Ag. is Most Basic Occupation					-.045 (-.050)	**	-.045 (-.045)	
Ag. Land Preservation					.061 (.065)	***	-.057 (-.063)	
Health Concern					-.021 (-.027)		.125 (.175)	***
Environmental Concern					-.008 (-.024)		-.044 (-.128)	**
Political Liberalism					.019 (.019)		-.015 (-.016)	
Intercept	-.298	***	-.161	**	.045		.372	*
F-score	21.891	***	15.389	***	4.090	***	4.521	***
R^2	.022		.054		.007		.027	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-16. Perceptions and Personal Models Predicting Conventional Structure

	Perceptions (1992)		Perceptions (2001)		Personal (1992)		Personal (2001)	
Personal Perception								
Grew up on farm	.028		.130					
	(.014)		(.064)					
Grew up in country	.146	**	.096					
	(.060)		(.047)					
Live on farm	-.362	***	-.348	*				
	(-.098)		(-.098)					
Live in country	-.113	*	-.202	*				
	(-.044)		(-.085)					
Familiarity with Agriculture	-.088	***	-.168	***				
	(-.139)		(-.196)					
Owns farm	.083		.293	*				
	(.028)		(.083)					
Knows farm owner	-.051		-.019					
	(-.032)		(-.012)					
Personal Characteristics								
Female					.189	***	.277	***
(Reference: Male)					(.123)		(.186)	
Nonwhite					.120	***	.282	***
(Reference: White)					(.060)		(.169)	
Age					-.010	***	-.003	*
					(-.226)		(-.072)	
Educ.					-.026	*	-.080(-.176)	***
					(-.048)			
Income					-.025	**	-.016	
					(-.052)		(-.045)	
Northeast					.017		.120	
(Reference: South)					(.009)		(.061)	
Midwest					-.139	***	-.270	***
(Reference: South)					(-.077)		(-.152)	
West					-.177		.108	
(Reference: South)					(-.092)		(.159)	
Intercept	.256	***	.348	***	.573	***	.239	*
F-score	15.827	***	6.864	***	29.889	***	18.481	***
R^2	.037		.056		.077		.154	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-17. Trust and Ideas Models Predicting Alternative Technology

	Trust (1992)		Trust (2001)		Ideas (1992)		Ideas (2001)	
Trust of Network								
Trust Elected Officials	-.044 (-.069)	***	.025 (.039)					
Trust Business Managers	-.150 (-.218)	***	-.157 (-.218)	***				
Trust University Professors	.018 (.025)		.052 (.081)	*				
Pre-existing Ideas								
Ag. is Most Basic Occupation					.028 (.034)	*	.074 (.078)	**
Ag. Land Preservation					.073 (.084)	***	.025 (.029)	
Health Concern					.143 (.196)	***	.169 (.242)	***
Environmental Concern					.132 (.418)	***	.082 (.247)	***
Political Liberalism					.051 (.057)	***	.095 (.098)	**
Intercept	.264	***	.033		-1.879	***	-1.611	
F-score	61.955	***	10.861	***	300.899	***	45.046	***
R^2	.061		.038		.345		.217	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-18. Perceptions and Personal Models Predicting Alternative Technology

	Perceptions (1992)		Perceptions (2001)		Personal (1992)		Personal (2001)	
Personal Perception								
Grew up on farm	-.038		-.242	***				
	(-.021)		(-.122)					
Grew up in country	-.020		.027					
	(-.009)		(.013)					
Live on farm	.013		-.050					
	(.004)		(-.015)					
Live in country	.011		-.183	*				
	(.005)		(-.079)					
Familiarity with Agriculture	-.009		.080	*				
	(-.016)		(.096)					
Owns farm	-.387	***	-.476	***				
	(-.140)		(-.138)					
Knows farm owner	-.078	**	-.079					
	(-.054)		(-.051)					
Personal Characteristics								
Female					.245	***	.134	**
(Reference: Male)					(.173)		(.092)	
Nonwhite					-.055		.076	
(Reference: White)					(-.030)		(.047)	
Age					-.005	***	-.006	***
					(-.123)		(-.149)	
Educ.					-.012		.049	**
					(-.024)		(.111)	
Income					.013		-.075	***
					(.030)		(-.220)	
Northeast					.151		.056	
(Reference: South)					(.083)		(.030)	
Midwest					-.007		.101	
(Reference: South)					(.004)		(.058)	
West					.147	***	.070	
(Reference: South)					(.082)		(.039)	
Intercept	.107	***	-.066		.061		.302	**
F-score	12.543	***	6.085	***	19.980	***	8.254	***
R^2	.030		.050		.053		.075	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-19. Trust and Ideas Models Predicting Conventional Technology

	Trust (1992)		Trust (2001)		Ideas (1992)		Ideas (2001)	
Trust of Network								
Trust Elected Officials	-.001 (-.001)		.112 (.145)	***				
Trust Business Managers	.084 (.111)	***	.097 (.011)	**				
Trust University Professors	.054 (.067)	***	.089 (.028)	**				
Pre-existing Ideas								
Ag. is Most Basic Occupation					.020 (.022)		.006 (.005)	
Ag. Land Preservation					-.097 (-.102)	***	-.130 (-.121)	***
Health Concern					-.259 (-.322)	***	-.280 (-.330)	***
Environmental Concern					-.043 (-.124)	***	-.032 (-.080)	*
Political Liberalism					.063 (.063)	***	.012 (.010)	
Intercept	-.284	***	-.474	***	1.141	***	1.353	***
F-score	20.011	***	24.519	***	129.913	***	33.148	***
R^2	.021		.083		.184		.169	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-20. Perceptions and Personal Models Predicting Conventional Technology

	Perceptions (1992)		Perceptions (2001)		Personal (1992)		Personal (2001)	
Personal Perception								
Grew up on farm	-.174	***	-.043					
	(-.085)		(-.018)					
Grew up in country	-.040		-.423	***				
	(-.016)		(-.173)					
Live on farm	-.112		-.148					
	(-.030)		(-.035)					
Live in country	.078		.199	*				
	(.030)		(.070)					
Familiarity with Agriculture	.045	**	-.055					
	(.057)		(-.055)					
Owns farm	.173	**	.304					
	(.057)		(.073)					
Knows farm owner	.016		.114					
	(.010)		(.060)					
Personal Characteristics								
Female					-.398	***	-.307	***
(Reference: Male)					(-.255)		(-.174)	
Nonwhite					-.156	***	-104	
(Reference: White)					(-.077)		(-.053)	
Age					.004	***	.002	
					(.083)		(.042)	
Educ.					.103	***	.055	**
					(.012)		(.102)	
Income					-.004		.050	**
					(-.008)		(.121)	
Northeast					-.109	**	-.196	*
(Reference: South)					(-.054)		(-.085)	
Midwest					.080	*	.198	*
(Reference: South)					(.044)		(.094)	
West					-.063		.182	*
(Reference: South)					(-.032)		(.084)	
Intercept	-.104	**	.124		-.263	***	-.315	*
F-score	4.932	***	4.447	***	46.319	***	12.348	***
R^2	.012		.037		.115		.109	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-21. Full Regression Models Predicting Alternative and Conventional Structure

	Alternative Structure (1992)		Alternative Structure (2001)		Conventional Structure (1992)		Conventional Structure (2001)	
Trust of Network								
Trust Off.s	.053 (.069)	***	-.069 (-.105)	**	.062 (.090)	***	.088 (.135)	***
Trust Mgr.s	-.011 (-.013)		-.001(-.001)		.019 (.026)		.049 (.066)	
Trust Prof.s	.019 (.022)		-.013 (-.019)		.050 (.063)	***	-.010 (-.015)	
Pre-existing Ideas								
Ag. Occup.	.079 (.080)	***	.151 (.156)	***	-.008 (-.009)		-.020 (-.020)	
Ag. Land	.273 (.262)	***	.214 (.236)	***	.074 (.079)	***	-.066 (-.073)	*
Health Concern	.027 (.030)		-.063 (-.087)	*	-.015 (-.019)		.011 (.015)	
Env. Concern	-.009 (-.025)		.065 (.191)	***	-.014 (-.042)	*	-.031 (-.091)	**
Liberal	.088 (.082)	***	.057 (.057)		-.034 (-.035)	*	.021 (.021)	
Personal Perception								
Grew(farm)	.022 (.010)		-.033 (-.016)		.014 (.007)		-.006 (-.003)	
Grew(country)	.075 (.028)		.027 (.013)		.128 (.053)	**	.022 (.011)	
Live(farm)	-.172 (-.042)	*	-.093 (-.026)		-.398 (-.107)	***	-.313 (-.088)	*
Live(country)	-.002 (-.001)		-.065 (-.027)		-.140 (-.054)	**	-.121 (-.051)	
Familiar	.064 (.091)	***	.076 (.088)	*	-.052 (-.081)	***	-.093 (-.109)	**
Owns farm	.133 (.040)	*	-.119 (-.034)		.059 (.019)		.330 (.093)	**
Knows farm	-.073 (-.042)	*	.161 (.100)	**	-.053 (-.033)		.067 (.042)	
Personal Characteristics								
Female	.038 (.022)		-.062 (-.042)		.170 (.111)	***	.231 (.155)	***
Nonwhite	-.052 (-.024)		-.052 (-.031)		.095 (.048)	***	.223 (.134)	***
Age	-.001 (-.022)		.001 (.024)		-.010 (-.234)	***	-.003 (-.068)	
Educ.	-.003 (-.005)		-.084 (-.184)	***	-.031 (-.056)	**	-.089 (-.196)	***
Income	-.019 (-.036)		-.028 (-.081)	*	-.027 (-.056)	**	-.019 (-.054)	
Northeast	.031 (.044)		-.042 (-.022)		-.020 (-.010)		.098 (.050)	
Midwest	.179 (.090)	***	-.012 (-.007)		-.110 (-.061)	**	-.272 (-.153)	***
West	-.044 (-.020)		-.183 (-.100)	**	-.147 (-.076)	***	.092 (.050)	
Intercept	-1.354	***	-1.226	***	.568	***	.803	***
F-score	18.387	***	12.580	***	18.246	***	9.990	***
R^2	.130		.267		.129		.224	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-22. Full Regression Models Predicting Alternative and Conventional Technology

	Alternative Technology (1992)		Alternative Technology (2001)		Conventional Technology (1992)		Conventional Technology (2001)	
Trust of Network								
Trust Off.s	-.030 (-.048)	**	.001 (.002)		.033 (.047)	**	.153 (.198)	***
Trust Mgr.s	-.082 (-.120)	***	-.116 (-.161)	***	.070 (.093)	***	.073 (.083)	*
Trust Prof.s	.010 (.013)		.050 (.077)	*	-.001 (-.002)		.030 (.038)	
Pre-existing Ideas								
Ag. Occup.	.035 (.042)	**	.053 (.056)		.019 (.020)		.055 (.048)	
Ag. Land	.070 (.081)	***	.038 (.043)		-.091 (-.095)	***	-.097 (-.090)	**
Health Concern	.152 (.208)	***	.174 (.249)	***	-.221 (-.274)	***	-.222 (-.262)	***
Env. Concern	.121 (.384)	***	.074 (.222)	***	-.039 (-.111)	***	-.038 (-.095)	**
Liberal	.015 (.017)		.031 (.032)		.077 (.078)	***	.019 (.016)	
Personal Perception								
Grew(farm)	.010 (.005)		-.207 (-.105)	**	-.056 (-.027)		-.032 (-.013)	
Grew(country)	.051 (.023)		-.053 (-.026)		-.027 (-.011)		-.170 (-.070)	
Live(farm)	-.112 (-.033)	*	.009 (.003)		.042 (.011)		-.078 (-.019)	
Live(country)	.031 (.013)		-.114 (-.049)		.060 (.023)		.107 (.038)	
Familiar	-.012 (-.020)		.049 (.058)		.030 (.046)	*	-.069 (-.068)	
Owns farm	-.090 (-.032)		-.429 (-.124)	***	-.118 (-.039)	*	.275 (.066)	
Knows farm	-.018 (-.012)		.002 (.001)		-.040 (-.025)		.015 (.008)	
Personal Characteristics								
Female	.152 (.107)	***	.158 (.109)	***	-.337 (-.215)	***	-.305 (-.173)	***
Nonwhite	-.103 (.056)	***	-.080 (-.049)		-.115 (-.057)	***	-.018 (-.009)	
Age	-.004 (-.099)	***	-.003 (-.086)	**	.004 (.087)	***	.001 (.024)	
Educ.	.003 (.006)		.041 (.093)	**	.079 (.142)	***	.022 (.042)	
Income	.012 (.027)		-.044 (-.130)	***	-.001 (-.002)		.036 (.089)	*
Northeast	.097 (.053)	***	-.067 (-.035)		-.110 (-.055)	**	-.127 (-.055)	
Midwest	-.024 (-.014)		.109 (.062)		.079 (.043)	**	.124 (.059)	
West	.052 (.029)		.017 (.010)		.005 (.002)		.083 (.039)	
Intercept	-1.506	***	-1.284	***	.521	***	.661	**
F-score	84.994	***	15.466	***	46.055	***	15.215	***
R^2	.408		.309		.272		.306	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-23. Final Models Predicting Alternative and Conventional Structure

	Alternative Structure (1992)		Alternative Structure (2001)		Conventional Structure (1992)		Conventional Structure (2001)	
Trust of Network								
Trust Off.s	.055 (.072)	***	-.081 (-.124)	***	.066 (.095)	***	.112 (.171)	***
Trust Mgr.s								
Trust Prof.s					.054 (.068)	***		
Pre-existing Ideas								
Ag. Occup.	.082 (.083)	***	.145 (.149)	***				
Ag. Land	.274 (.263)	***	.212 (.233)	***	.066 (.070)	***	-.081 (-.089)	**
Health Concern			-.072 (-.101)	**				
Env. Concern			.071 (.209)	***	-.021 (-.060)	***	-.027 (-.079)	**
Liberal	.090 (.084)	***						
Personal Perception								
Grew(farm)								
Grew(country)					.126 (.052)	**		
Live(farm)					-.375 (-.101)	***		
Live(country)					-.143 (-.055)	**		
Familiar	.070 (.100)	***	.067 (.079)	*	-.054 (-.085)	***	-.090 (-.105)	***
Owns farm								
Knows farm	-.080 (-.046)	**	.138 (.086)	**				
Personal Characteristics								
Female					.165 (.108)	***	.251 (.169)	***
Nonwhite					.098 (.049)	**	.260 (.156)	***
Age					-.010 (-.228)	***		
Educ.			-.082 (-.181)	***	-.035 (-.064)	**	-.089 (-.196)	***
Income			-.027 (-.079)	*	-.024 (-.050)	**		
Northeast								
Midwest	.185 (.093)	***			-.106 (-.059)	***	-.323 (-.181)	***
West			-.163 (-.089)	**	-.150 (-.078)	***		
Intercept	-1.460	***	-1.155	***	.521	***	.636	***
F-score	57.149	***	11.666	***	27.281	***	25.744	***
R^2	.123		.258		.121		.203	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-24. Final Models Predicting Alternative and Conventional Technology

	Alternative Technology (1992)		Alternative Technology (2001)		Conventional Technology (1992)		Conventional Technology (2001)	
Trust of Network								
Trust Off.s	-.029 (-.045)	**	-.123 (-.171)	***	.030 (.043)	**	.167 (.217)	***
Trust Mgr.s	-.080 (-.117)	***			.069 (.091)		.075 (.086)	**
Trust Prof.s			.059 (.092)	**				
Pre-existing Ideas								
Ag. Occup.	.034 (.042)	**	.059 (.062)	*				
Ag. Land	.072 (.082)	***			-.083 (-.086)	***		
Health Concern	.149 (.204)	***	.165 (.235)	***	-.216 (-.269)	***	-.219 (-.259)	***
Env. Concern	.122 (.386)	***	.076 (.229)	***	-.039 (-.111)	***	-.039 (-.098)	**
Liberal					.080 (.080)	***		
Personal Perception								
Grew(farm)			-.225 (-.114)	***			-.090 (-.084)	**
Grew(country)							-.185 (-.075)	**
Live(farm)	-.129 (-.038)	*						
Live(country)								
Familiar			.053 (.064)	*				
Owns farm	-.112 (-.040)	**	-.403 (-.117)	***				
Knows farm								
Personal Characteristics								
Female	.147 (.104)	***	.175 (.121)	***	-.341 (-.218)	***	-.283 (-.161)	***
Nonwhite	-.106 (-.058)	***			-.124 (-.061)	***		
Age	-.005 (-.117)	***	-.003 (-.072)	*	.004 (.090)	***		
Educ.			.043 (.096)	**	.080 (.143)	***		
Income			-.041 (-.120)	***			.050 (.121)	***
Northeast	.116 (.034)	***			-.105 (-.052)	**	-.165 (-.071)	**
Midwest			.141 (.081)	**	.081 (.044)	**		
West	.060 (.034)	*						
Intercept	-1.419	***	-1.258	***	.566	***	.876	***
F-score	149.324	***	26.726	***	87.061	***	37.165	***
R^2	.402		.301		.268		.293	

Note: 1992 (n=2,866), 2001 (n=819); unstandardized coefficients reported, standardized coefficients in parentheses; significant at p<.05*, at p<.01**, and at p<.001***

Table 5-25 Standardized Regression Coefficients for 1992 Structural Equation Model

	Conventional Technology (1992)	Alternative Technology (1992)	Conventional Structure (1992)	Alternative Structure (1992)
Trust of Network				
Trust Officials	.038 + .000 = .038	-.057 + .000 = -.057	.129 + .000 = .129	.000 + .000 = .000
Trust Managers	.000 + .130 = .130	.070 + -.242 = -.172	.000 + .001 = .001	.000 + -.031 = -.031
Trust Professors	.083 + -.027 = .056	.000 + .051 = .051	.043 + .000 = .043	.058 + .007 = .065
Pre-existing Ideas				
Agrarianism (latent)	.000 + .000 = .000	.002 + .000 = .002	.000 + .000 = .000	.556 + .000 = .556
Sustainability Concerns (latent)	-.474 + .000 = -.474	.885 + .000 = .885	-.003 + .000 = -.003	.000 + .115 = .115
Political Liberalism	.000 + .063 = .063	.000 + -.119 = -.119	.000 + .000 = .000	.000 + -.042 = -.042
Personal Perceptions				
Perception (latent)	.000 + .066 = .066	.000 + -.123 = -.123	.000 + .000 = .000	.000 + .185 = .185
Personal Characteristics				
Female	-.165 + -.063 = -.228	.000 + .118 = .118	.095 + .000 = .095	.000 + .072 = .072
Nonwhite	-.049 + .000 = -.049	.000 + .000 = .000	.053 + .000 = .053	.000 + .000 = .000
Age	.127 + -.053 = .074	-.090 + .099 = .009	-.148 + .000 = -.148	-.093 + .109 = .016
Education	.164 + .000 = .164	.000 + .000 = .000	.000 + .000 = .000	.000 + .000 = .000
Income	.057 + .000 = .057	.000 + .000 = .000	-.088 + .000 = -.088	-.075 + .000 = -.075
Northeast	-.031 + .000 = -.031	.034 + .000 = .034	.000 + .000 = .000	.000 + .048 = .048
Midwest	.133 + -.050 = .083	-.052 + .094 = .042	-.154 + .000 = -.154	.000 + .012 = .012
West	.000 + .000 = .000	.035 + .000 = .035	-.052 + .000 = -.052	-.058 + .050 = -.008
R^2	.350	.760	.083	.304

Note: Standardized coefficients reported; Direct + Indirect = Total Effect; Latent variables are indicated in the model; Model fit statistics are reported in a separate table.

Table 5-26. Standardized Regression Coefficients for 2001 Structural Equation Model

	Conventional Technology (2001)	Alternative Technology (2001)	Conventional Structure (2001)	Alternative Structure (2001)
Trust of Network				
Trust Officials	.065 + .000 = .065	.000 + .000 = .000	.148 + .000 = .148	.000 + .000 = .000
Trust Managers	.000 + .130 = .130	.000 + -.207 = -.207	.000 + .037 = .037	.000 + -.052 = -.052
Trust Professors	.098 + -.071 = .027	.000 + .113 = .113	.000 + -.020 = -.020	.000 + .028 = .028
Pre-existing Ideas				
Agrarianism (latent)	.000 + .000 = .000	.000 + .000 = .000	.000 + .000 = .000	.543 + .000 = .543
Sustainability Concerns (latent)	-.545 + .000 = -.545	.865 + .000 = .865	-.154 + .000 =-.154	.000 + .217 = .217
Political Liberalism	.000 + -.144 = -.144	.000 + .229 = .229	.000 + -.041 = -.041	.000 + .010 = .010
Personal Perceptions				
Perception (latent)	.000 + .080 = .080	.000 + -.127 = -.127	.000 + .023 = .023	.000 + .139 = .139
Personal Characteristics				
Female	-.173 + -.078 = -.251	.000 + .124 = .124	.167 + -.022 = .145	.000 + .077 = .077
Nonwhite	.000 + .000 = .000	.000 + .000 = .000	.077 + .000 = .077	.000 + .000 = .000
Age	.000 + .000 = .000	.000 + .000 = .000	-.138 + .000 = -.138	-.069 + .000 = -.069
Education	.098 + .000 = .098	.000 + .000 = .000	.000 + .000 = .000	.000 + .000 = .000
Income	.091 + .000 = .091	.000 + .000 = .000	-.096 + .000 = -.096	-.133 + .000 = -.133
Northeast	.000 + .000 = .000	.000 + .000 = .000	.000 + .000 = .000	.000 + .110 = .110
Midwest	.000 + .000 = .000	.000 + .000 = .000	-.124 + .000 = -.124	.000 + .000 = .000
West	.000 + .000 = .000	.000 + .000 = .000	.000 + .000 = .000	.000 + .000 = .000
R^2	.400	.749	.118	.309

Note: Standardized coefficients reported; Direct + Indirect = Total Effect; Model fit statistics reported in separate table.

Table 5-27. Factor Loadings and Standardized Regression Coefficients for Latent Variables in the 1992 and 2001 SEM Models

	Perceptions (1992)	Perceptions (2001)	Sustainability (1992)	Sustainability (2001)	Agrarian (1992)	Agrarian (2001)
Factor Loadings						
Familiarity	.812	.917				
Lives on Farm	.397	.390				
Grew Up on Farm	.572	.587				
Owns Farm	.513	.505				
Knows Farm Owner	.561	.592				
Health Concern			.561	.589		
Environmental Concern			.646	.650		
Ag. Land					.489	.585
Ag. Occupation					.421	.437
St. Regression Coefficients						
Sustainability Concerns (latent)					.207	.399
Personal Perceptions (latent)			-.140	-.146	.333	.255
R^2			.159	.206	.193	.238

Table 5-28. Goodness-of-Fit Measures for 1992 and 2001 Structural Equation Models

Measure	Rule-of-Thumb	1992	2001
χ^2, degrees of freedom	Not significant	850.68, 192***	525.73, 186***
Ratio (χ^2/df)	Between 2 and 5	4.431	2.826
CN (.05 level)	At least 200	759	341
Normed Fit Index (Δ_1)	About .9	.931	.855
Relative Fit Index (ρ_1)	About .9	.883	.803
Incremental Fit Index (Δ_2)	About .9	.946	.901
Tucker Lewis Index (ρ_1)	About .9	.907	.863
Comparative Fit Index (CFI)	About .9	.945	.900
RMSEA	Less than .05	.035	.047

Note: *** indicates statistical significance at the p<.001 level. Rule-of-Thumb criteria are based on Bollen's (1989) discussion.

Table 5-29. Summary of Support for Study Hypotheses

Variable	Predicted Relationship with… Conventional Technology	Alternative Technology	Conventional Structure	Alternative Structure
Trust of Network				
Trust of Business Managers	Positive OLS: 1992,2001 SEM: 1992,2001	Negative OLS: 1992 SEM: 1992,2001	Positive OLS: ns SEM: 1992,2001	Negative OLS: ns SEM: 1992,2001
Trust of Elected Officials	Positive OLS: 1992,2001 SEM: 1992,2001	Negative OLS: 1992,2001 SEM: 1992	Positive OLS: 1992, 2001 SEM: 1992,2001	Negative OLS: 2001 SEM: ns
Trust of University Professors	Positive OLS: ns SEM: 1992,2001	Negative OLS: ns SEM: ns	Positive OLS: 1992 SEM: 1992	Negative OLS: ns SEM: ns
Personal Perceptions				
Owning a Farm (latent variable: Perceptions)	Positive OLS: ns SEM: 1992,2001	Negative OLS: 1992,2001 SEM: 1992,2001	Negative OLS: ns SEM: ns	Positive OLS: ns SEM: 1992,2001
Friends/Relatives Own a Farm (latent variable: Perceptions)	Positive OLS: ns SEM: 1992,2001	Negative OLS: ns SEM: 1992,2001	Negative OLS: ns SEM: ns	Positive OLS: 2001 SEM: 1992,2001
Familiarity with Farming (latent variable: Perceptions)	Positive OLS: ns SEM: 1992,2001	Negative OLS: ns SEM: 1992,2001	Negative OLS: 1992,2001 SEM: ns	Positive OLS: 1992,2001 SEM: 1992,2001
Grew Up on a Farm (latent variable: Perceptions)	Positive OLS: ns SEM: 1992,2001	Negative OLS: 2001 SEM: 1992,2001	Negative OLS: ns SEM: ns	Positive OLS: ns SEM: 1992,2001
Lives on a Farm (latent variable: Perceptions)	Positive OLS: ns SEM: 1992,2001	Negative OLS: 1992 SEM: 1992,2001	Negative OLS: 1992 SEM: ns	Positive OLS: ns SEM: 1992,2001
Grew Up in the Country (latent variable: Perceptions)	Positive OLS: 1992,2001 SEM: 1992,2001	Negative OLS: ns SEM: 1992,2001	Negative OLS: ns SEM: ns	Positive OLS: ns SEM: 1992,2001
Live in the Country (latent variable: Perceptions)	Positive OLS: ns SEM: 1992,2001	Negative OLS: ns SEM: 1992,2001	Negative OLS: 1992 SEM: ns	Positive OLS: ns SEM: 1992,2001

Note: Positive or Negative indicates the predicted direction of the hypothesis; OLS and SEM support for 1992 and 2001 are reported; ns refers to "not supported"

Table 5-29. (continued)

Variable	Predicted Relationship with… Conventional Technology	Alternative Technology	Conventional Structure	Alternative Structure
Personal Characteristics:				
Gender (Female)	Negative OLS: 1992, 2001 SEM: 1992,2001	Positive OLS: 1992,2001 SEM: 1992,2001	Negative OLS: ns SEM: ns	Positive OLS: ns SEM: 1992,2001
Race (Nonwhite)	Negative OLS: 1992 SEM: 1992	Positive OLS: ns SEM: ns	Negative OLS: ns SEM: ns	Positive OLS: ns SEM: ns
Age	Positive OLS: ns SEM: 1992	Negative OLS: 1992, 2001 SEM: ns	Negative OLS: 1992 SEM: 1992,2001	Positive OLS: ns SEM: 1992
Education	Positive OLS: 2001 SEM: 1992,2001	Negative OLS: ns SEM: ns	Positive OLS: ns SEM: ns	Negative OLS: 2001 SEM: ns
Income	Positive OLS: 2001 SEM: 1992,2001	Negative OLS: 2001 SEM: ns	Positive OLS: ns SEM: ns	Negative OLS: 1992 SEM: 1992,2001
Region of the Country	Difference OLS: 1992, 2001 SEM: 1992	Difference OLS: 1992, 2001 SEM: 1992	Difference OLS: 1992, 2001 SEM: 1992,2001	Difference OLS: 1992, 2001 SEM: 1992,2001
Pre-existing Ideas:				
Political Liberalism	Negative OLS: ns SEM: 2001	Positive OLS: ns SEM: 2001	Negative OLS: ns SEM: 2001	Positive OLS: 1992 SEM: 2001
Agrarian Land Use (latent variable: Agrarianism)	Positive OLS: ns SEM: ns	Negative OLS: ns SEM: ns	Negative OLS: 2001 SEM: ns	Positive OLS: 1992,2001 SEM: 1992,2001
Agrarian Occupations (latent variable: Agrarianism)	Positive OLS: ns SEM: ns	Negative OLS: ns SEM: ns	Negative OLS: ns SEM: ns	Positive OLS: 1992,2001 SEM: 1992,2001
Environmental Concern (latent variable: Sustainability Concerns)	Negative OLS: 1992,2001 SEM: 1992,2001	Positive OLS: 1992, 2001 SEM: 1992,2001	Negative OLS: 1992,2001 SEM: 1992, 2001	Positive OLS: 2001 SEM: 1992,2001
Health Concern (latent variable: Sustainability Concerns)	Negative OLS: 1992,2001 SEM: 1992,2001	Positive OLS: 1992, 2001 SEM: 1992,2001	Negative OLS: ns SEM: 1992,2001	Positive OLS: ns SEM: 1992,2001

Note: Positive or Negative indicates the predicted direction of the hypothesis; OLS and SEM support for 1992 and 2001 are reported; ns refers to "not supported"

Table A1-1. Distribution of Persons by Selected Demographic and Household Characteristics: Unweighted and Weighted 1992 Survey Results and U.S. Totals

Characteristics	Weighted Sample	Unweighted Sample	Percent U.S. Totals	Difference (Weighted – U.S.)
Sex				
Male	45.9	67.8	48.8	-2.9
Female	54.1	32.2	51.2	2.9
Race				
Black	11.4	4.6	12.1	-1.1
White	79.3	93.3	80.3	-1.0
Other	9.7	2.1	7.6	2.1
Age				
34 years and younger	32.5	20.5	53.3	-20.8
35 to 64 years	44.9	55.1	34.1	10.8
65 and older	22.6	24.4	12.6	10.0
Education				
Some high school or less	26.6	11.5	21.6	5.0
High School Graduate	23.9	26.4	38.6	-14.7
Some College	27.4	25.1	18.4	9.0
College Graduate	22.1	37.0	21.4	.7
Family Income				
Less than $10,000	12.8	8.1	9.4	3.4
10,000 to 14,999	11.8	8.2	7.5	4.3
15,000 to 24,999	15.7	18.0	16.4	-.7
25,000 and over	59.6	65.8	66.8	-7.2
Place of Residence				
Large Metropolitan city	19.2	15.3		
Medium or small city	42.6	44.2		
Town, village or country	33.4	33.0		
Farm or ranch	4.9	7.5		
(Number)	(2,866)	(2,866)		

Table A1-2. Distribution of Persons by Selected Demographic and Household Characteristics: Unweighted and Weighted 2001 Survey Results and U.S. Totals

Characteristics	Weighted Sample	Unweighted Sample	Percent U.S. Totals	Difference (Weighted – U.S.)
Sex				
Male	44.9	60.7	49.1	-4.2
Female	55.1	39.3	50.9	4.2
Race				
Black	6.6	3.0	12.7	-6.1
White	72.2	91.1	80.1	-7.9
Other	21.1	5.9	7.2	13.9
Age				
34 years and younger	24.8	11.0	49.1	-24.3
35 to 64 years	48.5	57.5	38.5	10
65 and older	26.7	31.5	12.4	14.3
Education				
Some high school or less	23.0	5.1	15.8	7.2
High School Graduate	26.8	18.1	33.1	-6.3
Some College	19.5	25.6	17.6	1.9
Technical/Associate Degree	7.4	8.1	7.8	-.4
College Graduate	16.3	28.4	17.0	-.7
Family Income				
Less than $10,000	19.8	5.0		
10,000 to 14,999	8.0	4.9		
15,000 to 24,999	17.8	9.6	11.5	6.3
25,000 and over	54.5	80.6	78.9	-24.4
Place of Residence				
Large Metropolitan city	25.5	21.9		
Medium or small city	40.1	44.2		
Town, village or country	29.4	28.9		
Farm or ranch	5.0	5.0		
(Number)	(819)	(819)		

Table A1-3. Survey Comparison on Background Characteristics (percentages)

		Where he or she grew up		
	Married	Farm	Country	Large City
1992 S246 Survey	62	20	12	16
1990 U.S. Census	62			
1992 CPS	61			
1991 NORC GSS	53	17	12	14
1992 Roper	60			
2001 S276 Survey	55	17	16	17
2000 U.S. Census	56			
2001 CPS	60			
2000 NORC GSS	56	18	11	16
2001 Gallup	47			

Source: 1992, and 2001 Surveys by S246 and S276 research teams; 2001 Gallup data from the Gallup Organization (and 2001); National Opinion Research Center (NORC) data calculated from Davis and Smith (1991) General Social Survey (GSS) codebooks, and 2000 NORC data from the online codebook (see reference); U.S. decennial census (1990; 2000) and Current Population Survey (1992; 2001) data calculated from U.S. Bureau of the Census The Roper Poll data (1991) are from a survey conducted for the National Rural Electric Cooperative Association.

Table A1-4. Survey Comparison on Church Attendance (percentages)

	Once a year or Less	About once a Week or More
1992 S246 Survey	23	39
1991 NORC GSS	22	35
2001 S276 Survey	30	33
2000 NORC GSS	36	35

Source: 1992 and 2001 Surveys by S246 and S276 research teams; National Opinion Research Center (NORC) data calculated from Davis and Smith (1991) General Social Survey (GSS) codebooks, and 2000 NORC data from the online codebook (see reference)

Table A1-5. Survey Comparison on Political Party Preferences (percentages)

	Democrat	Republican	Independent/Other
1992 S246 Survey	48	33	20
1992 Center	50	37	13
1991 NORC GSS	45	47	13
1992 Roper	36	28	36
2001 S276 Survey	41	31	25
2000 NORC GSS	39	26	36
2001 Gallup	31	33	34

Source: 1992 and 2001 Surveys by S246 and S276 research teams; Center for Political Studies University of Michigan (U.S. Bureau of the Census 1994: 286); National Opinion Research Center (NORC) data calculated from Davis and Smith (1991) General Social Survey (GSS) codebooks, and 2000 NORC data from the online codebook (see reference); the Roper Poll Data (1992) are from a survey conducted for the National Rural Electric Cooperative Association.

Table A1-6. Survey Comparison on Political Ideologies (percentages)

	Conservative	Middle	Liberal
1992 S246 Survey	34	52	14
1991 NORC GSS	32	40	28
1992 Roper	44	36	20
2001 S276 Survey	28	57	15
2000 NORC GSS	34	39	27
2001 Gallup	40	34	18

Source: 1992 and 2001 Surveys by S246 and S276 research teams; Center for Political Studies University of Michigan (U.S. Bureau of the Census 1994: 286); National Opinion Research Center (NORC) data calculated from Davis and Smith (1991) General Social Survey (GSS) codebooks, and 2000 NORC data from the online codebook (see reference); the Roper Poll Data (1992) are from a survey conducted for the National Rural Electric Cooperative Association.

Table A1-7. Survey Comparison on Voting in Presidential Elections (percentages)

	Voted in Election
1992 S246 Survey	78
1988 Federal Elections Committee	50
1988 IDEA	50
1988 Current Population Survey	57
2001 S276 Survey	76
2000 Current Population Survey	55
2000 Federal Election Committee	51
2000 IDEA	49
2000 Congressional Quarterly	55

Source: 1992 and 2001 Surveys by S246 and S276 research teams; 1992 and 2001 IDEA (Institute For Democracy and Electoral Assistance) figures are from their online figures (see reference) ; Federal Election Committee figures were taken from the official FEC website (see reference); 1992 and 2001 Current Population Survey are from the U.S Bureau of the Census, Statistical Abstract of the United States for respective years; The 2001 Congressional Quarterly was taken from the official website of the U.S. Census

Table A1-8. Survey Comparison on Miscellaneous Selected Items (percentages)

	Internet Access	Global Warming	Labor Union Membership	Label GM Foods
2001 S276 Survey	44	76	19	92
2000 CPS	42			
2001 CPS			14	
2000 NORC GSS			12	
2001 Gallup		85		
2000 Harris				86
1999 Pew				84
1998 Yankelovich				82

Source: 2001 Survey is from the S276 research team; 2000 and 2001 Current Population Survey are from the U.S. Bureau of the Census; 2001 Gallup Organization; Harris, Pew, and Yankelovich from 2001 Public Opinion Quarterly (Shanahan, Schuefele, and Lee)

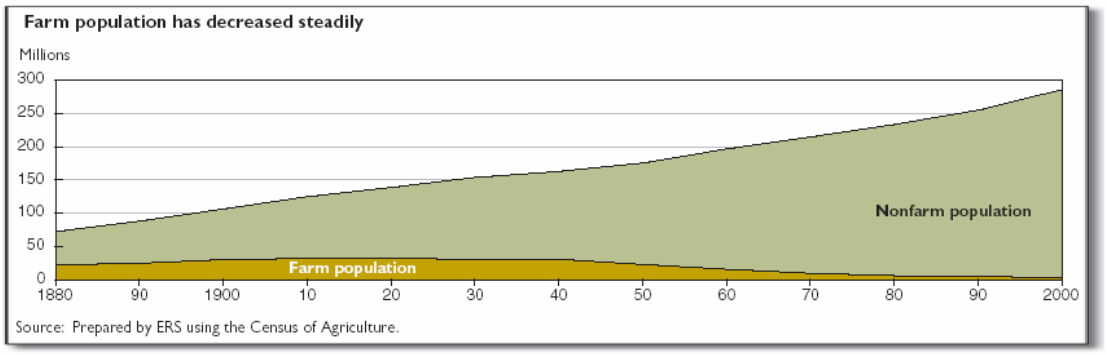

Figure 2-1. Decrease in Farm Population
Source: Economic Research Service, USDA (2005)

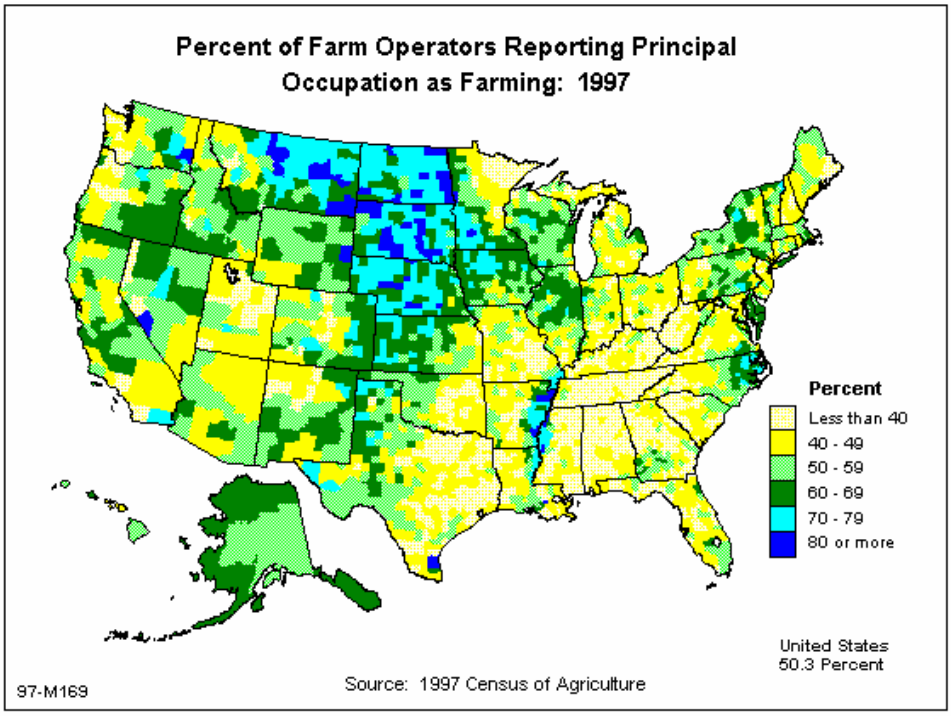

Figure 2-2. Percent of Farm Operators Reporting Principal Occupation as Farming
Source: National Agricultural Statistical Service, USDA (1997b)

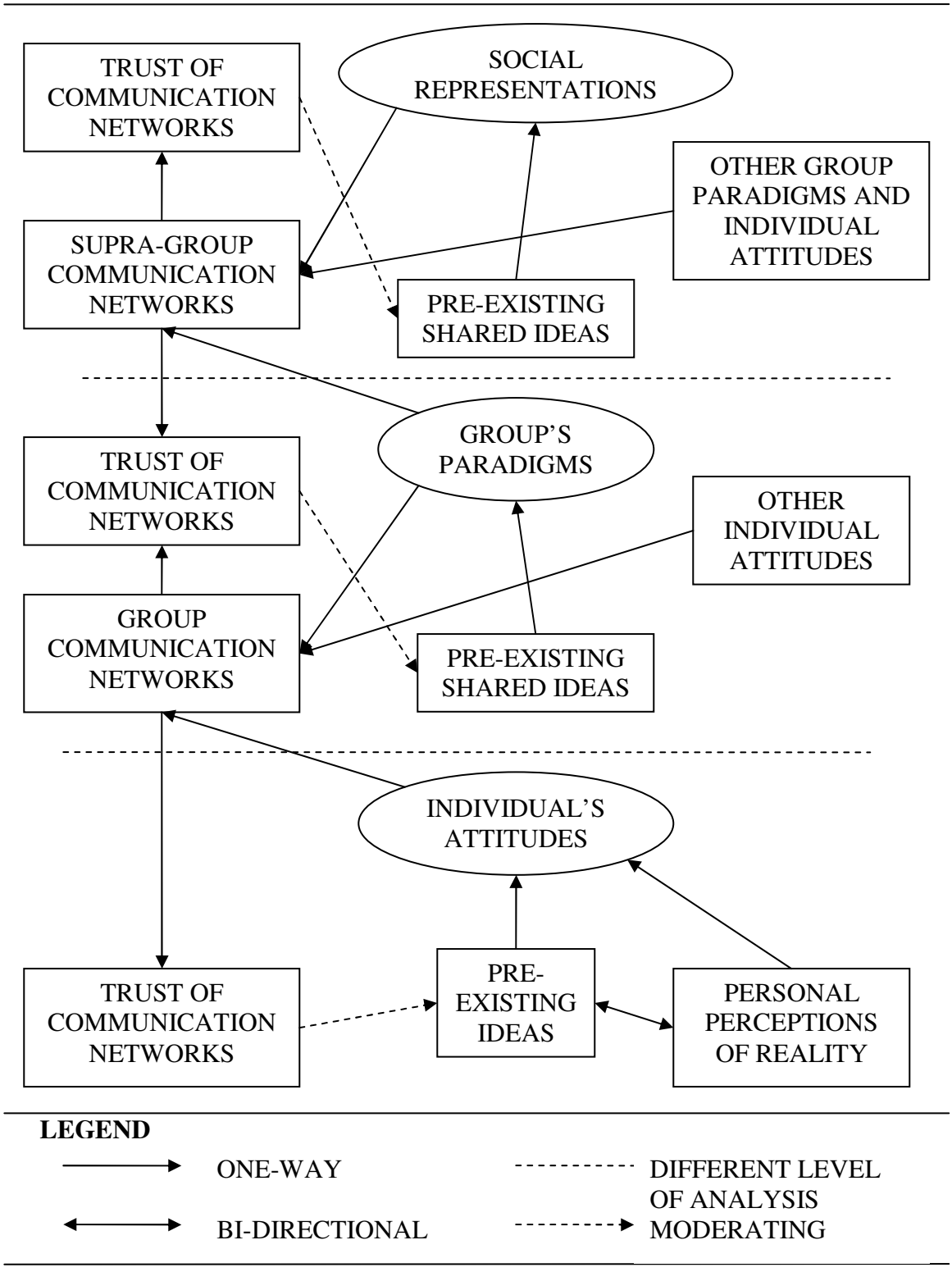

Figure 3-1. A Diagram of Information Flow in Social Representation Theory

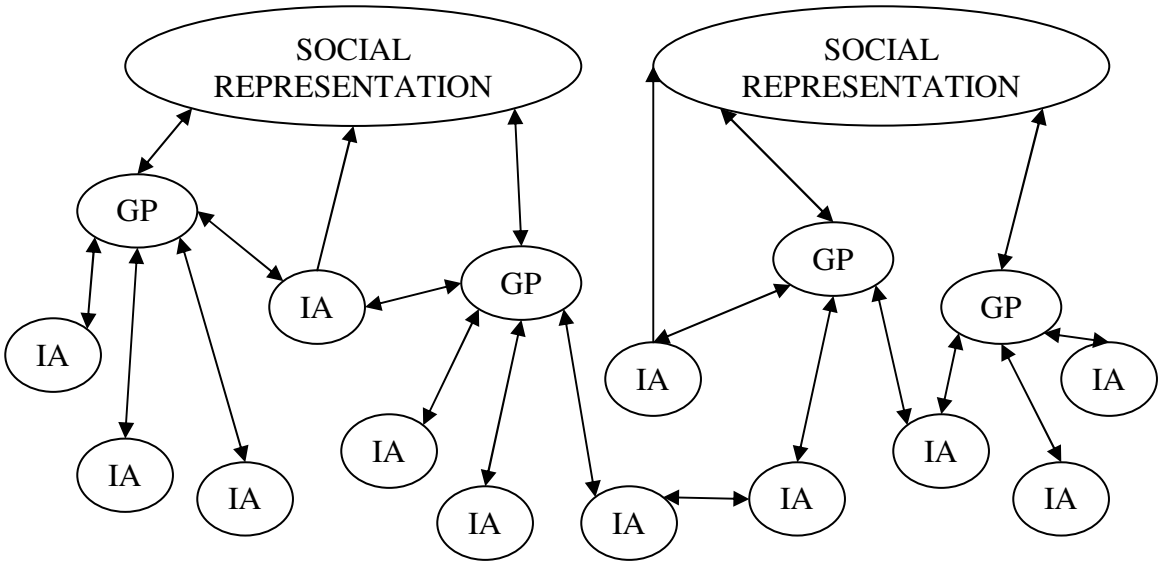

Figure3-2. Configuration of Individual Attitudes (IA), Group Paradigms (GP), and Social Representations Showing Information Flows

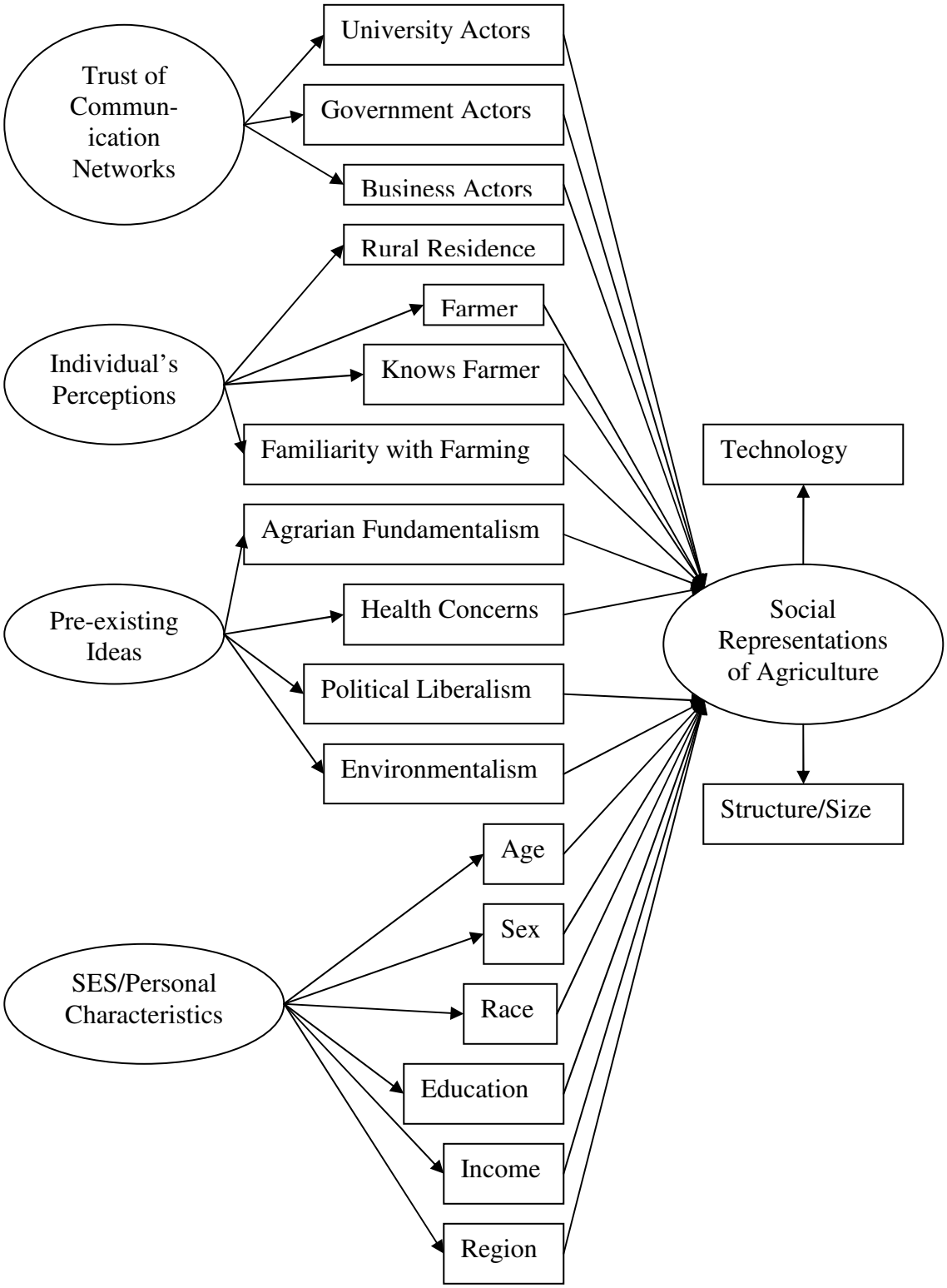

Figure 4-1. Conceptual Map

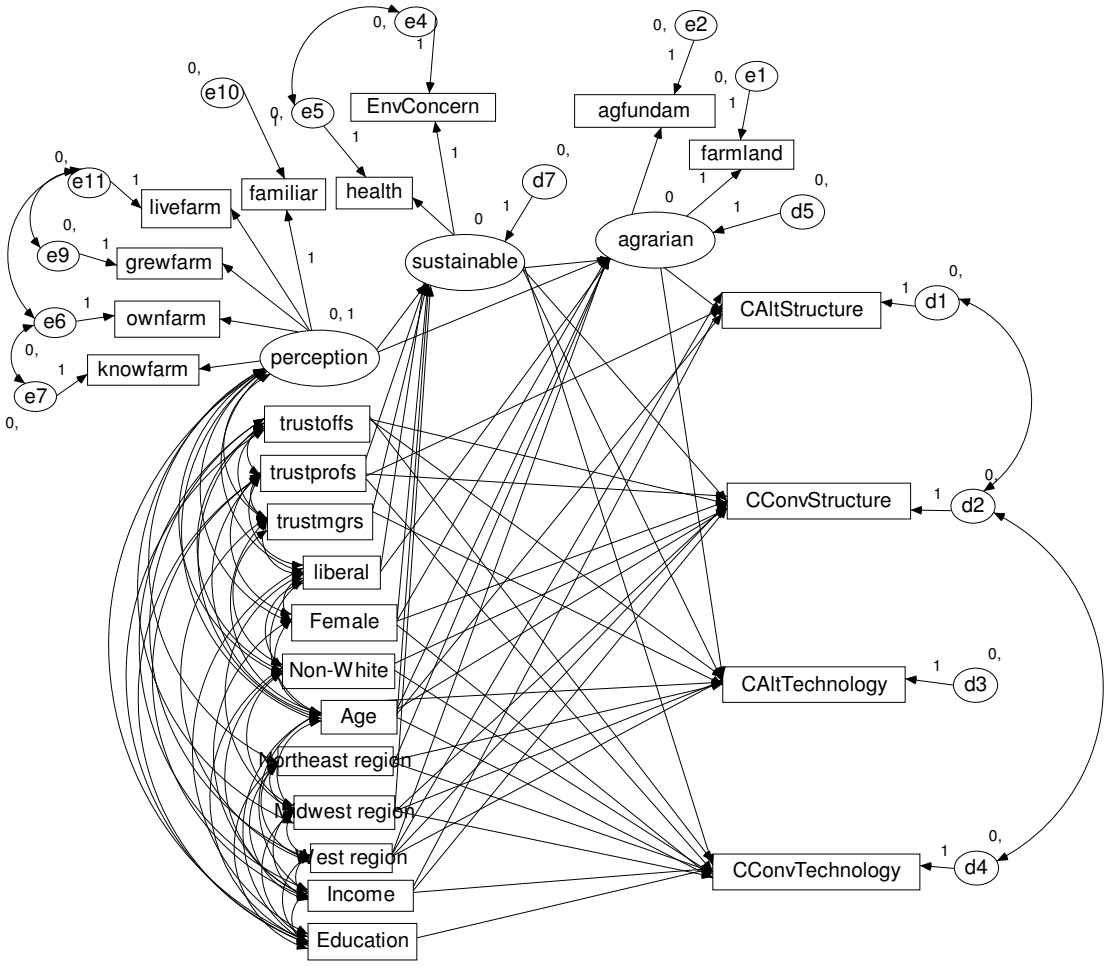

Figure 5-1. 1992 Structural Equation Model

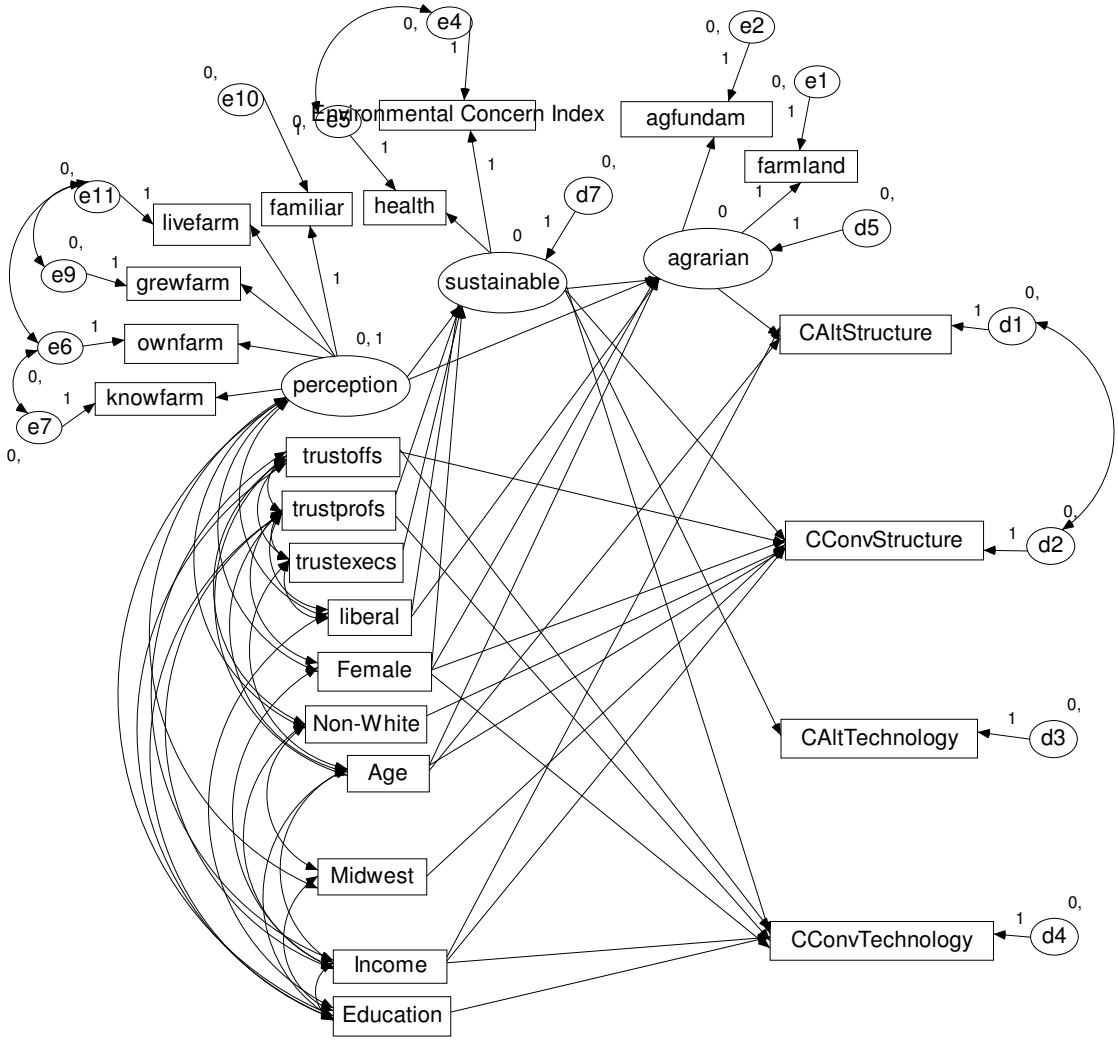

Figure 5-2. 2001 Structural Equation Model