

Theoretical Project 1

Hypothesis Testing: Historical Research on Individual and Group Decision Making in Grasslands Agriculture

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In addition to conducting laboratory and field research, the Center will test hypothesis of individual and group decision processes and the use of scientific information and technological innovations to mitigate the impacts of climate variability in a historical study of agricultural practices in the grasslands regions of two continents in the late nineteenth and early twentieth centuries. Specifically, this research project will examine the available information, definition of decision frameworks, and decision processes of European-origin farmers and farm communities living in communities in the Great Plains of the United States and the Orange Free State in South Africa. The purpose of this research is to analyse the extent to which contemporary decision processes identified and tested in Center research projects are replicated in earlier time periods. These historical case studies will provide longer time horizons for observing (a) the impacts of extreme changes in weather, available information, and technological innovation on the framing of individual and group decision processes; (b) the consequences of individual and group actions and decisions under these conditions; and (c) individual and group adaptation or reformulation of decisions and decision frameworks as weather patterns and technological information and applications changed. Hypotheses for testing will be selected in consultation with researchers in other Center projects. The study will be conducted in years four and five of the Center in order to build on and test the findings of earlier laboratory and field studies.

There are a number of reasons why these two areas, during this time period, provide a valuable laboratory to examine research hypotheses on individual and group decision making. Both the Upper Great Plains of the United States and the agricultural areas of the Orange Free State had been recently settled by European-origin farmers who had migrated into the area from other, different types of agricultural regions. These farmers had neither traditional knowledge nor experience with the climate in their new setting. In addition, both regions also experienced significant and well documented climate variability in the period from 1880 to 1940 (Gutmann Pullum Cunfer Hagen, 1998-1999; Haley Papers). Variability at this time was felt more keenly by farmers than by residents in the rapidly growing urban areas because farmers were so dependent upon rainfall, the length of the growing season, freedom from pests and disease, and conditions of the roads and transportation networks to markets, all of which could be directly influenced by climate variability.

This was also a period in which a number of technological innovations and changes in grasslands agricultural and marketing practices were introduced, such as the use of barbed wire, mechanization of agriculture, alternative plowing practices, provision of information over radio, and others. These innovations provided farmers with new tools and information they could use to moderate the impacts of uncertain weather conditions. By altering some of the impacts of climate, change the decision context (Archer, 2000; Beinart, 1997; Webb, 1931).

The record of climate change at local to regional scales (that is, at the level of the farm or the community) is often difficult to obtain for narrow historical periods. However the advantage of studying the settlement of these major continental grasslands is that there was well documented seasonal to interannual climate variability in the late nineteenth and early twentieth centuries (El-Ashry Gibbons, 1988; Worster, 1985; Beinart Coates, 1995). In the Great Plains, the study will encompass the initial period of settlement in the last several decades of the nineteenth century through the Dust Bowl conditions during the Great Depression of the 1930s. In South Africa it will include examination of transitions from various types of stock grazing to market-based agriculture (Beinart, 1986). In both areas, agriculture land use was extended during periods of ample rainfall and contracted, particularly in marginal areas, during periods of little rainfall (Drought Investigation, 1923). Variability will serve as a surrogate for climate change during this period.

We know that the decision of in-migrant farmers to settle in new agricultural areas is generally influenced by multiple factors, including social networks, transportation routes, public land policy, and perceptions of economic opportunity (Miller, 1979). But we know far less about the decision making that took place once the settlers found themselves in situations characterized by rapid and unexpected climate variability. In this study, we will examine the ways that farmers framed their options in the face of these uncertainties and made decisions both individually, in terms of their own farming activities, and as a group, in terms of establishing collective or community resources to facilitate the marketing and sales of their products. The project will examine individual decisions related to land selection, land use, crop selection, farming vs. livestock grazing, “overstocking” and soil exhaustion, and production for changing commercial markets. It will also study group decisions (and individual involvement in group decision processes) related to legal and policy issues of access to water and land (riparian rights and fencing the land), the construction of local storage facilities, and the framing of economic and policy issues related to transportation and access to markets in each locality.

Among the evidence to be examined are public records and legal documents related to land sales, regulation, and land use; private correspondence and diaries; agricultural, trade, and demographic statistics; and contemporary accounts in newspapers, public speeches, campaign rhetoric, published articles, sermons, and other sources. In both regions under study, the historical record is well preserved and available for research, although many of the written records of individual actions and perceptions are only available in archives in the region itself.

Educational Tools. In addition to providing case studies to test hypotheses of decision processes resulting from Center research, the historical research conducted in this project will provide material to be used in a module in the undergraduate class on decision making at Columbia and in the development of on-line lesson plans for secondary students. These educational material will stress the decision context and decision framing, and they will teach the students how to use both primary and secondary documents in their analysis. The advantage of using historical studies of decision processes in the classroom is that they are intrinsically less politicized than studies of decision making applied to contemporary problems. As a consequence, historical case studies provide a better means of isolating the issues of decision making under climate uncertainties from current political and economic issues related to climate change and climate variability. In addition, they force the students to concentrate more fully on the topic of decision making and the identification of decision-making skills.

Working in collaboration with the Columbia Center for New Media in Teaching and Learning, the Center will develop an on-line lesson plan for secondary school teachers based on the historical case studies. This lesson plan will consist of discussions of the decision making context in grassland agricultural areas of North American and South Africa, reading assignments, class discussion questions, maps, and data and information on weather, the introduction of new technologies, regional demographic changes, ecosystem changes resulting from settlement of the land, land use patterns, and agricultural productivity in each area. Students will be asked to put themselves in the situation faced by farmers in the two regions. The lesson plan will be tested in classrooms in secondary schools in New York City before being placed on the project's web site for the use of secondary school teachers in other systems.

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