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PROCEEDINGS OF THE WORKSHOP:

***Local Knowledge and Climate Change:
Fieldwork Experiences***

Verona, March 12-14, 2015

Editor: *Giovanni Bennardo*



Università
di Verona
Dipartimento TeSIS

Convegno Internazionale

Local Knowledge and Climate Change: Fieldwork Experiences

March 12, 2015

from 9:15 to 12:30 and from 14:30 to 18:30

Biblioteca Arturo Frinzi
Via S. Francesco, 20

Program

9:15 - 9:30	Gian Paolo Romagnani Direttore Dipartimento TeSIS, Università di Verona	12:30 - 14:30	LUNCH
9:30 - 9:45	Giovanni Bennardo Visiting Professor, Università di Verona	14:30 - 14:55	Victor C. DeMunck , <i>Rural Lithuania</i> State University of New York, La Paltz, NY, USA
9:45 - 10:10	John B. Gatewood , <i>Pennsylvania, USA</i> Lehigh University, Bethlehem, PA, USA	14:55 - 15:20	James S. Boster , <i>Baltic Sea, Poland</i> National Marine Fisheries Research Institute (NMFR), Gdynia, Poland
10:10 - 10:35	Eric Jones , <i>Highland, Ecuador</i> University of Texas, Houston, TX, USA	15:20 - 15:55	Anna Painsi , <i>Dolomites, Italy</i> Università di Verona, Verona, Italy
10:35 - 11:00	Hidetada Shimizu , <i>Central Japan</i> Northern Illinois University, DeKalb, IL, USA	15:55 - 16:10	BREAK
11:00 - 11:15	BREAK	16:10 - 16:35	Justus Ogembo , <i>Western Kenya</i> University of New Hampshire, Manchester, NH, USA
11:15 - 11:40	Wenyi Zhang , <i>Southwest China</i> Sun Yat-Sen University, Guangzhou, China	16:35 - 17:00	Thomas Widlok , <i>Kalahari, Namibia</i> University of Cologne, Cologne, Germany
11:40 - 12:05	Katharine L. Wiegeler , <i>Batangas, Philippines</i> Northern Illinois University, DeKalb, IL, USA	17:00 - 17:25	Giovanni Bennardo , <i>Tonga, Polynesia</i> Northern Illinois University, DeKalb, IL, USA
12:05 - 12:30	Steve Lyons , <i>Punjab, Pakistan</i> Durham University, Durham, UK	17:30 - 18:30	DISCUSSION

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Università
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WORKSHOP

Local Knowledge and Climate Change: Fieldwork Experiences

Verona, March 12-14, 2015

Organized by

Giovanni Bennardo

Presidential Research Professor

Department of Anthropology

Cognitive Studies Initiative

and Environment, Sustainability and Energy Institute

Northern Illinois University

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Introduction

Giovanni Bennardo
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Climate change is one of the most challenging issues we collectively face insofar as it threatens the survival of our species. Before long, extensive action will have to be implemented worldwide to minimize its potential and disastrous effects (such actions have already been initiated in the last two decades). The populations keenly aware of and most at risk from the effects of climate change are obviously those whose livelihood depends on daily contact with the changing physical environment. Primary food producers best represent these populations: farmers, fishermen, herders, and hunter-gatherers. Of course all humans are at risk and we will eventually be obliged to change our behavior to make our presence on the planet sustainable (see Moran, 2006, 2010). However, primary food producers' daily and close contact with the environment makes them most directly affected by climate change. Besides, they will likely be asked to implement whatever new and/or radical remedial policies are proposed. Before carrying out any strategies directly impacting these populations, it would be prudent to understand their Cultural Models (from now on, CMs) of Nature.

All primary food producers hold views—mostly out-of-awareness (Kempton, 2001), as most of our knowledge is (e.g., knowledge about language) —about nature and the environment, particularly in terms of how they are affected by and must adapt to changes in the latter. Such out-of-awareness knowledge structures are typically called cultural models (Holland and Quinn, 1987).

One of the most widely accepted ways of understanding the organization of knowledge in the mind is that of mental models (Johnson-Laird, 1980, 1999). When a mental model comes to be shared within a community, then one calls it a “cultural model” (Holland and Quinn, 1987; D’Andrade, 1989; Shore, 1996; Strauss and Quinn, 1997; Quinn, 2005; Kronenfeld, 2008; Bennardo, 2009). These out-of-awareness mental structures are used to make deductions about the world, to explain relationships in a causal fashion, and to construct and interpret representations from simple perceptual inputs to highly complex information. Importantly, they can also motivate behavior (D’Andrade and Strauss, 1992; Kempton, Boster, and Hartley, 1995; Atran and Medin, 2008), or more precisely, contribute saliently to the generation of behavior. In other words, we use cultural models to make sense of the world around us and at the same time they provide the basis out of which we plan our behavior (see also Paolisso, 2002).

A cultural model of nature must minimally include a number of relationships (e.g., associative, co-occurring, and mostly causal) between fundamental and constitutive categories such as plants, animals, physical environment, weather, people, and the supernatural. Causal relationships may be intra-categorical (e.g., between people, between animals, etc.) or cross-categorical (e.g., between people and animals, between animals and plants, etc.; see Atran and Medin, 2008). These causal relationships contribute to a large part of what constitute reasoning about nature.

Even though they are shared, cultural models are not necessarily distributed uniformly within a population/community. Thus, after discovering a model, it becomes

imperative to explore its level of sharedness within the communities, i.e., cultures, under investigation and the degree to which it differentially motivates people to act (Kempton and Clark, 2000; Gatewood and Lowe, 2008).

On March 12-14, 2015, at the Biblioteca Frinzi (Frinzi Library) of the University of Verona, Italy, a workshop was held entitled “***Local Knowledge and Climate Change: Fieldwork Experiences.***” The workshop was organized by Giovanni Bennardo (Northern Illinois University) and Anna Paini (University of Verona, Italy) and was sponsored by the National Science Foundation (NSF), and by the Dipartimento TeSIS and the Biblioteca Frinzi, both at University of Verona, Italy. Twelve scholars from American, European, and Chinese institutions participated to the workshop. They reported on extensive (5-10 weeks) fieldwork conducted in communities in twelve countries on five continents (see Figure 1): China, Ecuador, Japan, Kenya, Italy, Lithuania, Namibia, Pakistan, the Philippines, Poland, the Kingdom of Tonga (Polynesia), and the United States.¹ The workshop participants pursued deeper understandings of the CMs of Nature held in these communities and proposed to continue in the near future their attempt to understand the distribution of such models within the targeted communities.



Figure 1: Field Sites

The workshop represents a milestone for the project, “Cultural Models of Nature Across Cultures: Space, Causality, and Primary Food Producers.” This project started in September 2011 with a first NSF-sponsored 3-day workshop whose results were published as *Proceedings of Workshop: Cultural Models of Nature and the Environment: Self, Space, and Causality* (Bennardo, ed.).² In June 2013, the resulting research proposal

¹ A 13th site (Amazon, Brazil) has been added after the workshop date and a 14th site (Alaska, USA) will be added in spring 2016.

² Working Paper #1. DeKalb, IL.: Environment, Sustainability, and Energy Institute, NIU.

was funded by NSF.³ During summer 2014,⁴ the scholars involved in the project conducted field research at their respective field sites and, once back at their institutions, systematically processed and analyzed the data. These Proceedings contains the results of the analyses presented and discussed in the workshop at the University of Verona.

The Research Project.

The NSF-sponsored research project entitled “Cultural Models of Nature Across Cultures: Space, Causality, and Primary Food Producers” is investigating CMs of Nature⁵ across several cultures held by populations/communities of primary food producers such as farmers, fishermen, herders, and hunter-gatherers. Evidence suggests that CMs of Nature influence environmental actions in ways not necessarily predicted by more traditional ecological models (see Kempton, Boster, and Hartley, 1995; Atran and Medin, 2008). While traditional ecological knowledge tends to freeze knowledge in the past, CMs affect attention, observation, reasoning, and understanding and therefore engage with the current situation.

A significant characteristic of this research project is the use of a consistent methodology—for data collection and for data analysis—by all the scholars. The advantage of this strategy is that the results will be comparable across all the communities/cultures investigated. A preliminary comparison of the results of the Animals-in-a-Row task data (from now on ‘space task’) is introduced in Chapter 14 “Preferences for a Frame of Reference among Primary Food Producers across Cultures: Results of the Animals-in-a-Row Task” of this work.

Data Collection. The project’s twelve scholars and three graduate students have conducted field work and are each experts in the particular cultural area where they collected the data necessary for constructing CMs of Nature. The data was collected using a variety of methods, including: nature walks, open interviews, semi-structured interviews, free-listing tasks, and space tasks (see Bennardo, 2012). The data-collection activities were administered to a sample of each community population. The sample was obtained by keeping in mind parameters such as age, gender, kinship relationships, education, occupation, and religion. Where possible, all the interviews were video-recorded and later transcribed with the help of native speakers.

The free listing tasks were conducted about the etically-chosen six major components of Nature: plants, animals, physical environment, weather, humans, and the supernatural. Each scholar in the field modified these components to reflect emic categorization strategies. Often the space tasks were administered to this same group of individuals. Both the free listing tasks and the space task were audio- and/or video-recorded.

³ NSF Grant #BCS 1330637.

⁴ No field work could be conducted in summer 2013 because the NSF funds became available only in September.

⁵ I capitalize Nature when the word defines a CM. I also want to draw attention to the fact that capitalized ‘Nature’ and lower case ‘nature’ have two distinct meanings. The latter is typically intended to mean a specific part and type of the environment (e.g., woods, trees, rivers, etc.) or some biologically-given aspect of existence (i.e., instinct), while the former may include all that exists.

Data Analyses. The scholars analyzed the transcriptions of the semi-structured interviews using a combination of the following: key words analysis, gist analysis, metaphor analysis, reasoning analysis, and causality analysis. The results of the free-listing tasks were analyzed to discover the frequency of each item mentioned in all the lists obtained. The assumption behind any free listing task is that ‘first listed’ items stand for ‘more salient’ items. The results of the space task were analyzed for frequency of relative FoR (frame of reference) or absolute FoR choices by each individual and across the number of individuals (range 10-43) who were administered the task.

Relevance of the Findings. The preliminary findings of the research project reported here provide insights in three major areas:

1. The various CMs of Nature suggested should enrich the already conspicuous literature about cultural models (e.g., Holland and Quinn, 1987; Kempton, Boster, and Hartley, 1995; Shore, 1996; Strauss and Quinn, 1997; Quinn, 2005; Gatewood and Cameron, 2009; Bennardo, 2009; Bennardo and de Munck, 2014);
2. The possibility that conceptions of space are central to the construction of molar CMs should provide supporting evidence for an architecture of the mind that includes a major role for the spatial domain in the construction of other domains of knowledge (see Gattis, 2001; Mandler 2008; Bennardo, 2009);
3. Policy makers, that is, major actors in finding solutions to climate change-induced problems, should benefit from the information on indigenous/local CMs of Nature; this information should assist them in their decision-making (see Kempton, 2001; Lauer and Aswani, 2009). In fact, we are convinced that CMs of Nature contribute to the generation of a variety of behaviors in response to environmental changes in food-production communities worldwide. Taking this knowledge into consideration is essential for the planning and implementation of any successful intervention projects in climate change-affected areas.

Causal Models and CMs of Nature.

The authors in this volume hypothesize a variety of CMs of Nature found in the communities investigated. These CMs represent specific organizations of the etically suggested constitutive categories underlying the concept of Nature, that is, plants, animals, physical environment, weather, humans, and the supernatural. Causal relationships are one of the major forces weaving together these categories. When presenting hypotheses about a CM of Nature in the communities investigated, many scholars make reference to and at times refines one or more of the three causal models suggested by Bennardo (2014) as possibly characterizing the internal causal structure of CMs of Nature (see also Sloman, 2009; Rips, 2014).

The three causal models suggested in Bennardo (2014) are the holistic model (see Figure 2), the God-centered model (see Figure 3), and the human-centered model (see Figure 4).

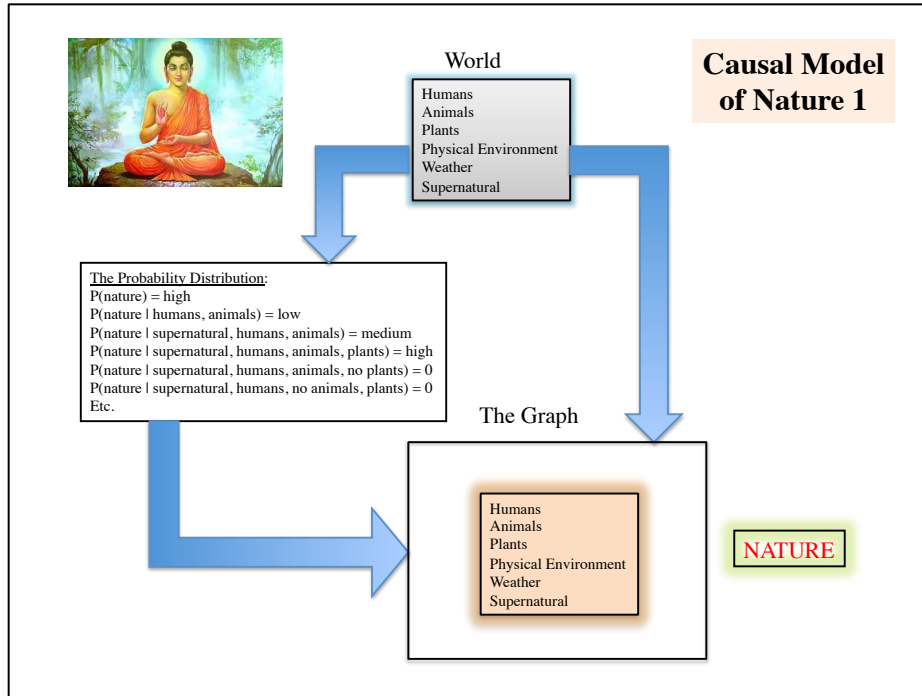


Figure 2: Holistic Causal Model of Nature (1) (from Bennardo, 2014)

The holistic causal model in Figure 2 is based on “The Probability Distribution” of the various components of the “World.” The model is graphically represented by the box labeled “The Graph,” i.e., the concept of Nature, that includes all these components, insofar as no clear separation among them is conceived as probable.

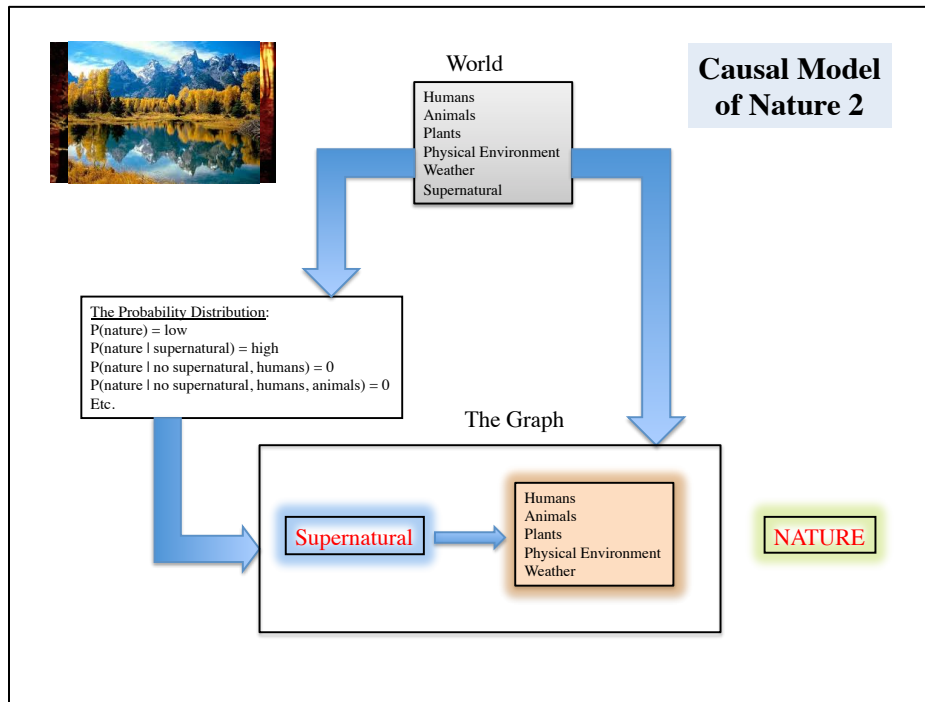


Figure 3: God-Centered Causal Model of Nature (2) (from Bennardo, 2014)

The God-centered causal model (see Figure 3) is based on a different probability distribution. The graphic representation makes clear that the “Supernatural” component of the “World” is separate from the other components when the concept of Nature is constructed.

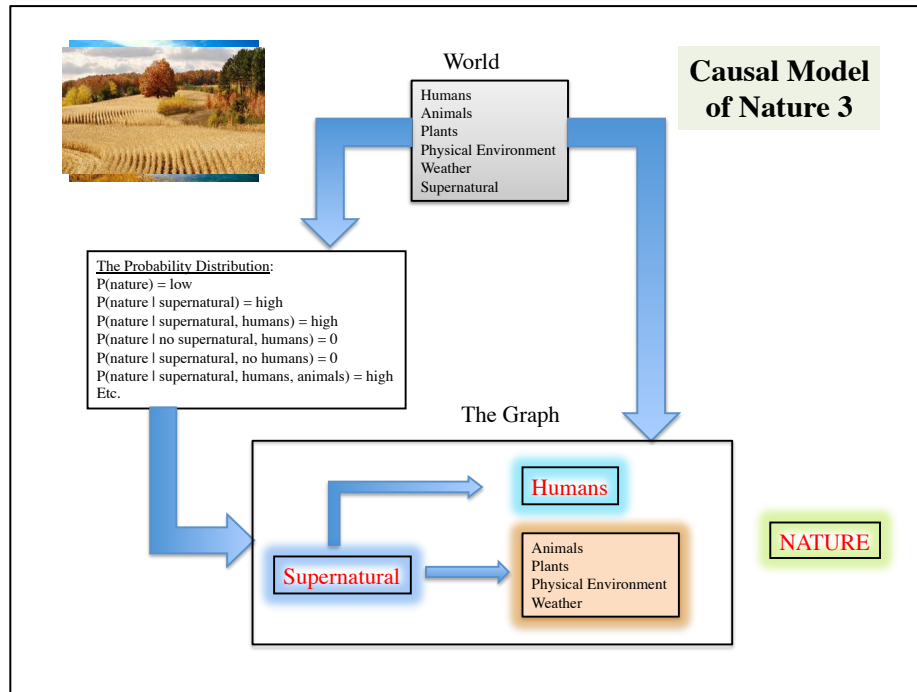


Figure 4: Human-Centered Causal Model of Nature (3) (from Bennardo, 2014)

The human-centered causal model (see Figure 4) is based on a third type of probability distribution. This time, the graphic representation makes clear that not only the “Supernatural” but also the “Humans” component of the “World” is separate from the other ones when the concept of Nature is constructed.

The Three-Day Workshop.

Day One: Presentation of Results from Interviews. The first day was devoted to the presentations of the results from the semi-structured interviews conducted in the field. The interview questions were formulated during the first NSF-sponsored workshop in 2011 (see Bennardo, 2012: 126). The questions were mainly about daily activities of the individuals interviewed. Since the interviewees were primary food producers, the expectation was that CMs of Nature would be activated and used to answer the questions.

Each scholar analyzed the interview texts using a personal combination of the following: key word analysis, gist analysis, metaphor analysis, reasoning analysis, causal analysis. They discovered features of a possible CM of Nature and hypothesized a possible model shared by the members of the community. The discussions following the presentations highlighted a number of commonalities among their findings.

All community members perceived changes in their climate change-affected environment. These changes were typically explained ‘locally’ and rarely related to ‘global’ causes. Many of the CMs of Nature contained internal contradictions and often

the presenters indicated the presence of two or more CMs used within individuals or across individuals in any specific community.

Day Two: Presentation of Results from Free Listing Tasks and Space Tasks. The frequency analyses on the free listing tasks revealed that in almost all sites, the etically-proposed six components of Nature—plants, animals, physical environment, weather, humans, and supernatural—had to be modified to reflect emically-salient categories. The various lists, however, provided good clues as to the conceptual building blocks of the CMs of Nature hypothesized.

The results of these lists will also be utilized to refine the suggested CMs. In fact, the most salient (i.e. top ranked) elements on the lists can be used to conduct sorting tasks and rating tasks in the next phase of the project. The administration of these tasks will elicit fundamental categorical classification, some of which might be contributing to the construction of CMs of Nature.

The results of the space tasks are presented in Chapter 14. A critical finding was that the majority of the communities (83%) prefer the Absolute FoR over the Relative FoR. Regardless of preference, both were used in each site. This finding needs to be further investigated insofar as we had hypothesized that preferences in the spatial domain—a foundational CM—would contribute to the construction of molar CMs, specifically the CM of Nature. The space task findings seem to support a strict relationship between the two realms—space and CM of Nature.

Day Three: Planning the Future of the Research Project. Taking into consideration the commonalities that emerged from the presentations and discussions during the first two days, a clear consensus developed among the participants about the need for a second round of data collection and analysis. In this second phase, the results of the free listing tasks would be used to conduct sorting tasks and rating tasks. In the sorting task, the most salient content of each list⁶ would be presented to a sample of the community and each individual would be asked to group the listed items according to (emic) similarity-dissimilarity parameters. For the rating task, list items will be presented and informants will be asked about their relationship/s, e.g., is animal X helping or damaging plant Y? The results of this task should provide insights towards an understanding of the causal structure that holds together the various components of the CM of Nature.

The results of the analyses of the semi-structured interviews and the free-listing tasks—eventually the results of the sorting tasks and the rating tasks would be added—provided the necessary background knowledge and controversial findings (at times contradictory and/or ambiguous) that led to the proposal of conducting consensus analyses—both on the results of the tasks and on the results of the linguistic analyses. The methodological trajectory that was in the end proposed during the discussion of this third day of work is very similar to the one suggested by Bennardo and de Munck (2014, see Figure 5).

⁶ For example, the most salient plants or animals would be presented in laminated photos. Many scholars have already collected photos of most of the list items elicited.

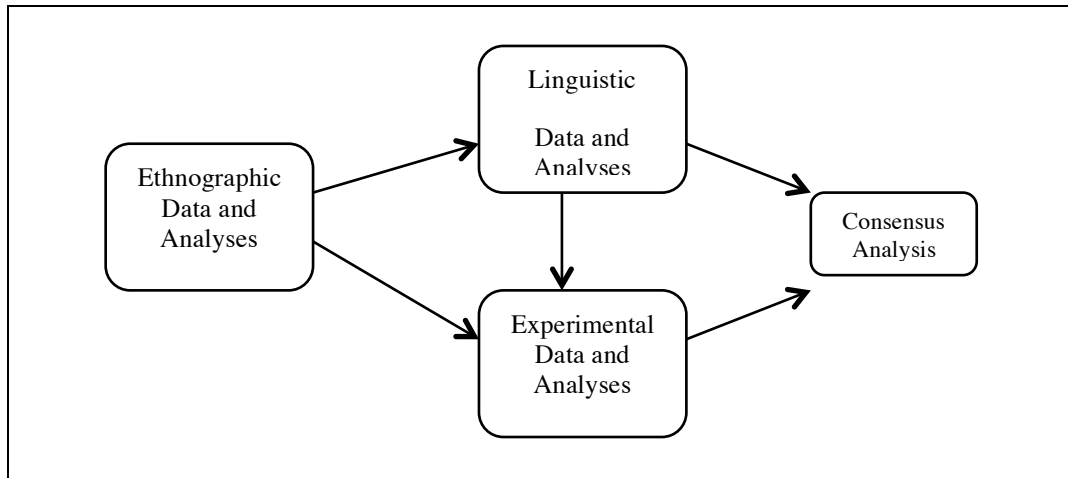


Figure 5: Methodological Trajectory (from Bennardo and de Munck, 2014: 286)

The consensus analyses conducted on the experimental data (free listing tasks, sorting tasks, and rating tasks) and on the results of the analyses (key words, gist, metaphor, reasoning, and causal analysis) on the linguistic data could possibly clarify the contradictions highlighted in the various CMs already hypothesized. In fact, they would provide information about the distribution of a CM (or CMs) within individuals, e.g., in different contexts, and also within the populations investigated, e.g., in groups composed by differences in age, gender, and/or status. Understanding distribution of CMs could also elucidate the degree to which specific CMs motivate people to act (Gatewood and Lowe, 2009).

Relevance of the Proceedings.

Scholars, policy makers, and lay individuals who actively conduct research on and pursue solutions to climate change, a challenging species-survival issue, should benefit from these Proceedings. The research results can foster sound policies not only based on de-contextualized scientific notions, but grounded in the local knowledge of the people directly responsible for adopting changes and possibly helping to create solutions.

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**Eastern Pennsylvania Farmers' Perceptions of the Factors
Most Responsible for Farming Success**

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Abstract

Eastern Pennsylvania farmers show strong similarities with respect to what factors are viewed as causing an operation to be successful. On the other hand, there are some differences in the extent to which they think they can control their farming success. While weather is critical and regarded as uncontrollable, differences stem from farmers' abilities, or lack thereof, to cope with price fluctuations for their field crops. Much of this probably reflects inter-individual differences in what social psychologists call *locus of control*, but it also reflects prior investment and marketing decisions, such as buying expensive grain-drying equipment so they can wait for prices to improve or developing relations with direct-retail customers. Farmers also differ in the role they attribute to luck and/or God. Based on preliminary and qualitative data, this paper reviews similarities and differences in farmers' causal thinking.

Based on a presentation given at Università di Verona, Italy, on 12 March 2015.

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1. Background.

Fieldwork Setting.

The Lehigh Valley is located in east-central Pennsylvania about 100 miles west of New York City and 65 miles north of Philadelphia. The study area itself is about 50 miles (E-W) and about 40 miles (N-S) with approximately 750,000 people living in the region. The settlement pattern is mixed, i.e., about a third of the population lives in three small cities (Allentown, Bethlehem, Easton) and the rest live in suburban tracts and smaller towns surrounding the three cities.

The region was first settled by Europeans in the 1700s, and for at least a hundred and fifty years the economy was primarily agricultural. Beginning in the mid-1800s and lasting through the late-1900s, the economic base shifted to heavy industry (e.g., Bethlehem Iron Works, Bethlehem Steel, Mack trucks, and other manufacturing industries). Since the 1980s, the economy has shifted once again, becoming much more diversified (e.g., warehouses, electronics, biotech, health care, education, etc.).

The net effect of population growth and changes in the economic base is that open spaces for farming are being “developed” at a rapid pace, leaving only smaller plots of non-contiguous farmlands. And, because of the complex geology of the region, these open spaces are situated on a variety of soil types. As a result, within the relatively small study area, there are at least eight kinds of farms, categorized on the basis of their primary products and sources of income.

- Commercial grain farms ... corn, soybeans, hay, wheat
- Beef farms [small-scale]

- Dairy farms [small-scale]
- “Educulture” farms ... income mostly from student and tourist visitors
- Poultry farms ... turkey, chicken
- Exotic animal farms ... llama, alpaca, buffalo
- Orchards ... apples, pears, berries
- Organic vegetable farms [small acreage and/or greenhouses]

Goal and Methods.

The primary goal of this pilot study was to explore Eastern Pennsylvania farmers’ understandings of what factors, both human and non-human, affect their livelihood. (This was how the project was explained to potential participants in the Informed Consent Form and why they were willing to participate.) Of course, notions of causality with respect to farming rest upon and reflect more general conceptions of Nature and natural processes. But, people’s conceptions of Nature are often implicit and difficult to talk about, whereas farmers find talking about farming both easy and ‘natural.’

Being exploratory research, the methodology was qualitative and geared toward exploring the range of variation. The plan was to conduct audio-recorded, semi-structured interviews with a small sample of farmers, and then do gist analysis of the transcripts to identify common themes as well as areas of disagreement. The four-page interview guide (see Appendix) covered a wide range of topics, organized under six categories: personal background, work rhythms and job satisfaction, business aspects of current farming operation, the ‘head game’ of farming, perceptions of longer-term changes and trends, and the meaning of “Nature” and “natural.” In addition, I collected some free-listing data and persuaded participants to complete sets of five randomized presentations of the ‘animals-in-a-row’ task.⁷ In what follows, I summarize results from gist analysis of select parts of the interviews and focus mainly on grain farmers.

The Sample.

Given the qualitative nature of the pilot study, purposive sampling to explore the range of variation is appropriate. But, finding farmers willing to spend two to three hours talking with a stranger is difficult. And, simply knocking on farm house doors or cold-calling folks will not necessarily recruit participants across the spectrum of variation. For these reasons, I asked for assistance from Penn State Agricultural Extension officials.

In mid-June 2014, I met with a local Extension agent and explained the purpose, approach, and sampling needs of the project. He thought the research sounded interesting – might produce findings of interest to farmers and to his agency – so he agreed to help me make initial contacts. Staying within his agency’s confidentiality agreements, he spoke to a variety of farmers about the research project and asked if they would be willing for me to contact them. If yes, he passed along names, phone numbers, and telegraphically succinct descriptions of their farming

⁷ Farmers thought the free-listing and animals-in-a-row tasks were very strange and quite unrelated to why they had agreed to speak with me. However, by acknowledging the *non sequitur* nature of the tasks upfront, I was able to cajole almost all the participants into doing the tasks. Indeed, I used them as “now for something completely different” breaks in the long interview session: free-listings about halfway through, and animals-in-a-row at the end.

operations to me. This indirect recruitment took about six weeks, but by the end of July, I had a list of 28 potential participants, which was a few more than the anticipated sample size of 20.

I decided to work through the list of potential participants beginning with grain farmers (they are not as busy in August as other months), then a few other kinds of farmers during the fall months (beef, dairy, and education), and end with organic vegetable farmers during the winter months. As matters turned out, the small amount of grant money ran out before I got to any vegetable farmers. Thus, the pilot study’s sample consists of 14 interviews with people involved in four of the eight kinds of farming in the region, and most were with commercial grain farmers.

The interviews were done at the farmer’s home, sometimes with spouse present and participating, and lasted from 2 – 3½ hours. All together, the interviews produced 400+ single-spaced pages of transcripts

2. Variations among Grain Farmers.

All commercial grain farms grow “field crops,” most commonly (hard, feed) corn and soybeans with wheat and hay usually less important. Some farms in this category augment their field crops with a few dairy or beef cows, and a few also grow Christmas trees. The mixture of products, as well as acreage devoted to each, generally follows from the soil types one owns or leases. Better soils are usually planted with corn or soybeans. Hilly or “shale” soils are for wheat, hay, trees, or pasturage.

Table 1. Diversity among Nine Grain Farm Operations

Farmer	Number workers	Acres worked	Acres owned	Products	Soil quality	Annual profits
Peter	8	4,000	2	“Custom” hay & field crops	Variable	\$100k
Dan	6	3,000	550	Field crops	Mostly good	\$150k
John	17	3,000	1,000	Field crops, Xmas trees, & trucking	Poor	\$100k
Don	3½	2,800	200	Field crops	Good	\$100k
Kyle	5	1,775	280	Field crops	Good	\$100k
Hank	2½	1,015	215	Field crops & 20+ beef cows	Variable	\$20k
Bill	4	650	250	Field crops & 47 dairy cows	Good	\$70k (?)
Keith	3	325	13	Field crops & 40 dairy cows	Poor	\$9k
Arnold	3	200	150	Field crops, trees, & 13 beef cows	Variable	\$10k

Pennsylvania farms are small compared to those in Midwest. Those in the sample ranged from 200 – 4,000 acres being worked (or 81–1,619 hectares). And, farmers lease most of the land they work from multiple owners; hence, the total acreage a grain farmer works is usually scattered in small plots (e.g., 10 to 100 acres) distributed over several miles.

Table 1 provides a few statistics to illustrate the diversity among grain farms in the study area. There are two caveats with respect to the information presented. Firstly, the farmers' names in the table are pseudonyms. Secondly, the figures in the rightmost column (average annual profits) are by no means exact. Even though all but one farmer⁸ answered my questions pertaining to this, virtually all had to do some mental arithmetic on the fly, and I do not think they were calculating "profits" the same way. Thus, the annual profits are rough estimates, not precise accountings.

3. Factors Believed to Influence Farming.

This topic was the principal focus of the pilot study and was how I explained the purpose of the study during my initial telephone contact with prospective participants. On the other hand, as evident from the structure of the Interview Guide (see Appendix), I thought it best to work up to the topic in a variety of ways. Thus, participants' thinking about the causal factors influencing their operations came up in bits and pieces during their interviews, not from responses to a single direct question.

Some participants tended to describe causal factors in rather general or categorical terms; others responded with specific examples; and yet others were vague on some points but quite specific on others. Analytically, however, the widely shared views fit rather easily into five broad categories, and most participants mentioned or gave at least one example for each of these.

1. Soil type / nature of the land itself ... given the complex sub-surface geology in Eastern Pennsylvania, there is a variety of soil types within short distances, and as noted previously, the nature of the land one farms puts significant limitations of how well different field crops will grow on it
2. Farmer's own work-ethic, knowledge, and skills ... willingness to work and not procrastinate, how much the farmer knows about the crops/animals and what they need to prosper as well as mechanical skills to keep equipment working, and especially the farmer's business and managerial skills (such as detailed record-keeping, long-term planning, and investment decisions)
3. Modern technologies ... wise use of soil science, plant genetics, computerized record-keeping, modern farm equipment (such as no-till planters with GPS systems), etc.
4. Marketing ... both marketing-decisions (when to sell) and marketing-arrangements (where to sell, i.e., commodity markets or develop direct-retail customers)
5. Weather ... local/regional weather, but also national and even international weather conditions

It is important to note that all of the above factors are viewed in mundane, secular, materialist terms. That is, they are understood as being just part of the way the material world and our economic system work. Another background understanding is that farmers do not believe they "make" their crops or animals grow. All that farmers can do is "help" their crops (or animals) grow by providing nutrients and conditions the plants need and trying to reduce the pests and diseases that jeopardize them. This sort of working with natural processes, along with wise business decisions, is regarded as the essence of successful farming.

⁸ "Bill" and I were interrupted in the midst of the relevant question. Thus, \$70,000 is my own estimate of "Bill's" average annual profits, not his. This corresponds to 10% of his average annual operating expenses,

Explaining Differential Success among Farms.

All the farmers interviewed regarded some farms (and farmers) as being more successful than others. Minimally, a “successful” farming operation is one that manages to stay in business over a significant amount of time (measured in years if not decades). Beyond that, some people are better farmers than others, in the sense that they get the most of the land they have to work. How much money one makes is only a crude measure of this “farming” ability, but to the extent that farming is a business, turning a profit is important else the operation will go bankrupt.

When asked why some farmers are more successful than others, participants in the study generally agreed about the factors most responsible:

1. Soil type / nature of the land itself
2. Farmer’s willingness to work hard, knowledge, managerial skills, and long-term business planning
3. Wise use of technologies, such as soil scientists, plant geneticists, no till planters, computerized and very detailed record-keeping, etc.
4. Well-informed marketing-decisions (when to sell) and how products are sold (to whom)

But, since these four factors are more or less constant for an experienced farmer, they cannot explain year-to-year fluctuations *for a given farm*

Explaining Year-to-year Fluctuations for One’s Own Farm.

All the study’s grain farmers reported wide variations with respect to the financial aspects of their operations over the years. All had experienced good years and bad years, and there was general agreement about the factors most responsible for this sort of variation:

1. Market price volatility
2. Weather conditions, especially locally and nationally

Market prices are viewed as mostly uncontrollable – because they are thought to be determined by supply-and-demand at a much higher, aggregate scale than individual farms or even regions – and only slightly predictable. The prices farmers receive are, thus, highly volatile year-to-year and even month-to-month, and especially so if the farmer sells his or her products through *commodity exchanges*. The Chicago Board of Trade’s prices (and this market sets the reference point for smaller, regional exchanges) are far beyond a farmer’s control. Farmers can only decide when to sell, although those who have invested in grain-drying equipment can delay selling for quite some time, waiting for prices to improve. The alternative to commodity exchanges is *direct-retail* arrangements. Farmers who have invested the time and energy to develop direct-retail customers (including contracts with big companies for “seed”) have much more control over the prices they receive for their products and, hence, do not have to endure as much price volatility.

Weather – especially as concerns the last frost in the spring, the timing and amount of rain during the growing season, and the first frost in the fall – is thought to be uncontrollable and only slightly predictable. One year, rain might fall at just the right times and in the right amounts, the

next year could be a drought, and the following year could be a wash-out. As a result, weather is seen as quasi-random variable over short time spans (hours, days), but a random variable over longer time periods (year-to-year, decades).

Factors about which Farmers Differ.

Despite the areas of general agreement just noted, there are some differences among farmers' understandings. A few farmers think the mundane, secular factors mentioned so far explain virtually *all* the important variations in farming – both long-term differences among farms and year-to-year fluctuations for any given farm. Most farmers, however, think the secular factors do not account for quite everything – there is residual variation the secular factors cannot explain. Thus, most believe there are additional, 'cosmological' factors at play that affect their livelihoods.

4. Explaining the Unexplained: Luck and/or God's Will.

Every participant's initial answers to my questions about the factors influencing farming success were of the secular, materialist sort, i.e., soil quality, farmer's skills, weather, etc. At different points in their interviews, however, about half of the participants *spontaneously* mentioned luck, God, or both as factors influencing their farming operation. (The rest did not mention these until I directly asked about such things, about two-thirds of the way through the Interview Guide.)

This 'reluctance' to mention more cosmological factors for an hour or more into the interview, or until directly asked, is interesting in itself. Perhaps it indicates the cognitive salience of different factors in participants' thinking, e.g., proximate causes are more salient than ultimate causes. On the other hand, I suspect it merely reflects the participants' presumptions about what sort of answers were expected by a stranger doing research about farming. That is, they were simply observing American social norms about appropriate topics to discuss with strangers – politics and religion being widely understood as potentially contentious subjects. And, indeed, once the topics were broached, whether after the participant felt comfortable with me or I directly asked, a considerable range of opinions about luck and God's role became evident.

Different Views of Luck.

Luck is a rather slippery concept. At a minimum, it seems to mean one has more fortuitous outcomes than would be probabilistically expected (good luck) or fewer fortuitous outcomes than would be probabilistically expected (bad luck, no luck). Although participants appeared to share this minimalist conception of what luck means, they showed a range of opinions concerning the importance of luck with respect to farming success:

- Those who simply don't believe in luck at all
[Secularist version] "One makes one's own luck."
[Religious version] "There is no such thing as luck – everything that happens is God's will."

- Those who believe in luck, but think it plays a relatively small role
“Luck accounts for maybe 10%-30% of year-to-year variation, but just in those situations where individuals have no control and timing is critical, such as rains at the right time and right amount or commodity prices going up or down at the right time.”
- Those who think luck plays a very large role in farming success
“Luck accounts for as much as 80% of farming success. You try hard to do the right things, but how much money you make depends mostly on things you can’t control.”

Different Views of God’s Role.

As with luck, farmers showed a range of opinions with respect to God’s role in farming success:

- Non-believers do not think gods cause anything
- Believers who think God, as Creator, is the ultimate cause of everything (including natural laws and processes), but not so much an active agent in the day-to-day workings of his creation
Such farmers tend to agree with the adage: “God helps those who help themselves.”
- Believers who think EVERYTHING that happens is a direct manifestation of God’s Will and his active intervention
A few in this category pray for God to intervene and assist with their day-to-day farming concerns, but most think it is simply inappropriate to ask for God’s assistance in crass business affairs.

5. Summary

Eastern Pennsylvania farmers pretty much agree about the main things affecting their livelihood. And, for the most part, their understandings are multi-causal involving what are perceived as mundane, secular, materialist factors, such as soil quality, farmer’s skills and knowledge, use of modern technologies, market prices, and weather.

Farmers differ from one another, however, in the degree to which they recognize other, more abstract causal factors. Most invoke notions of luck and/or God’s Will to make sense of what they regard as (otherwise) unexplained variations.

Luck is a very subtle concept, but seems to refer to more or fewer instances of felicitous outcomes than would be expected just by chance. In farming, luck comes up in situations where farmers must take actions vis-à-vis fluctuating circumstances over which they have little or no control. And, this boils down to the hard-to-predict but critically important fluctuations in **Market Prices** and **Weather** ... the same highly variable factors that some farmers believe God controls, whether through active intervention or as ultimate creator of nature and natural processes.

APPENDIX: Interview Guide

PERSONAL BACKGROUND

Where are you from?

How old are you?

How many years of schooling have you had?
(high school, college, post-graduate)

Are you married? – any children?

Do you have any relatives who are, or were, farmers? – What did your parents and brothers and sisters do for a living?

How many years have you been farming?

How did you get into farming?

What other sorts of work have you done, besides farming?

What proportion of your household income comes from farming?

WORK RHYTHMS AND JOB SATISFACTION

Does the farm work you do change much according to the time of year?

- If YES ... Please describe the seasonal pattern – what are your work-days like as the seasons change?
- If NO ... Please describe your 'typical' work-day.

What do you like and not like about the work you do as a farmer?

In terms of job satisfaction, how does farming compare with other work you have done?

If you had your life to live over, would you become a farmer again?

Would you like your children to become farmers?

Would you recommend farming as a career to young people? – why, or why not?

If you couldn't be a farmer, what other sort of work would you do?

CURRENT FARMING OPERATION ... the 'Business' Aspects

How big is your farm – how many acres of land all together?

Do you own the land, or are you leasing or renting it from someone else?

During a typical year, how many people work on your farm? Does the number of workers vary by season?

What crops are you growing? – what animals are you raising?

Where do you get your seeds for crops? – your breeding stock?

How many acres are currently planted with the (different) crops? – how many are being used for hay or pasturage? – how many acres lie fallow this year?

Which parts of your farm are the most and least productive?
WHY this variation? ... what makes one parcel more productive than another?

IF the farmland were sold to another farmer [not to a ‘developer’], what would be a “fair market price” for the land itself?
(not including houses or movable farm equipment, such as tractors)

What was your initial “start-up cost” to get your operation going the first year? And, how much money do you have invested since then in capital equipment and facilities?

In a typical year, approximately what are the farm’s:

- total operating expenses?
- total earnings? (after all expenses)

Where, or to whom, do you sell your products? – what is your ‘market’?
(local, regional, national, international)

What factors determine the price(s) you get for your products? ... Do you have any control over these prices?

To what extent is your farming dependent on government-provided subsidies, insurance, or price supports?

On a 1-to-10 scale, how much does your farming operation depend on petroleum products, i.e., fuel for farm equipment and transportation, as well as petrochemical fertilizers and pesticides.

THE ‘HEAD GAME’ OF FARMING ... Knowledge, Decisions, Causes

What are the essential knowledge, skills, and experience one needs to be a successful farmer?

What are the key decisions you have to make in order to be successful? – and what information do you need to make those decisions?

- [e.g., for CROPS]: How do you decide: ... which crops to grow ... when to plant ... how much land to plant with each variety and in which parcels ... when-and-where to sell?
- [e.g., for LIVESTOCK]: How do you decide: ... which animals to raise ... how large a herd to maintain ... what to feed them ... when-and-where to sell?

What are some of the constraints or problems you face as a farmer?

What makes plants and animals “grow”?

Why are there good years and bad years? – what factors cause this sort of variation? (RANK ORDER, if multiple factors)

Do government policies or agencies have much impact on your operation? – what are some 'positive' examples ... some 'negative' examples?

To what extent is your farming operation affected by things like ... the weather ... other farmers ... the national or global economy ... supply of oil ... wars / terrorist attacks ... prayer and God's will?

All things considered, who or what affects your farm the most?

What are the worst things farmers themselves could do to their farm? – what are the best things they could do for their farm?

Why are some farms more productive than others? – what are the critical factors underlying farming success?

How much “luck” is involved in farming?

How much can farmers control whether they have good or bad years, whether they succeed or fail?

... Why are some people “luckier” than others?

LONGER-TERM CHANGES / TRENDS

Has the overall productivity of the land you farm changed over the years?

- If YES ... Why are these changes occurring – what causes the longer-term trends in your farm's productivity?
- If NO ... Why is that? ... e.g., are you using more fertilizer / pesticide for crops, more antibiotics for livestock, to maintain the same level of productivity, or is there some other reason?

What changes have occurred in your farm's “environment” over the last several decades? (... e.g., fewer trees and shrubs, more wildlife, less wind erosion, more “development” encroaching on your land, etc.)

What effects does your farming operation have on the local environment?
(... e.g., soil quality, water drainage, the wild plants and animals in the area)

Are there any things you currently have to do in order to make your farming profitable but are perhaps bad for the local environment?

Have you noticed any changes in weather patterns over the last several decades?

- If YES ... How have you accommodated to these changes?

In general, do you think human activities have an effect longer-term weather patterns? Can humans do anything to change weather patterns?

A hundred years from now, do you think people in this region will be able to farm the way you do now? – why, or why not?

MEANING OF “NATURE” / “NATURAL”

What does “Nature” mean to you?

Does “Nature” mean the same thing as “the natural world”, or is there a difference?

If you were to say that something is “natural,” what would you mean by that?

What contrasts with “natural”? – i.e., if something is not natural, then what words might describe it?

Specific EXAMPLES for consideration:

- Is it “natural” for weeds to grow in a field?... How about the field itself – is a field “natural”? ... Is a tractor “natural”?
- Is it “natural” for birds to build nests? ... Is it “natural” for humans to build houses?
- Is it “natural” for beavers to build dams? ... Is it “natural” for humans to build dams?

**Care for the Soil and Live Respectfully:
A Cultural Model of Environmental Change among Quichua Speakers
in Andean Northern Ecuador**

**Eric C. Jones,
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Background and Site Description.

This report⁹ documents research in north-central Ecuador that is part of the project “Cultural Models of Nature across Cultures: Space, Causality, and Primary Food Producers”.¹⁰ The project conducts research in 12 countries, with at least one investigator per country, to understand how primary producers understand nature and environmental change. While each investigator is using the same data collection techniques, the interests and concerns of the people resulted in different coverage of the topics in each country. In Ecuador, what was most important to the informants was how much more difficult agricultural production is these days compared to the past.

The current research involves a single village to the north of the city of Cotacachi in the state of Imbabura, Ecuador. The village stretches westward up the slopes of Mt. Cotacachi from close to the north-flowing Alambi River. The larger canton or county of Cotacachi lies between the two Andean ranges in a valley 2,500 m above sea level in north central Ecuador, where average temperatures have historically had a narrow range, yearlong, at 15-20 degrees Celsius. The region was conquered by the Inka, but not much later was conquered and settled by Spaniards in 1544. The city of Cotacachi itself currently has around 9,000 residents, and is known for its colonial architecture, its leather crafts, and as a tourism destination. In the Cotacachi area, indigenous and non-indigenous smallholders mainly intercrop corn and pulses, and also grow potatoes, alfalfa for hay, peppers, and squash for household use and sale, as well as some vegetables and citrus for household use. Up higher on Mt. Cotacachi, people pasture their animals and grow wheat and barley. Just under half of smallholders have access to irrigated fields, based on a survey by the local Peasants and Indigenous Association (Skarbo and VanderMolen, 2014). Farmers are losing some traditional crops, while adding some new crops (Skarbo, 2006) like Cape Gooseberry for making raisins for urban consumption and export, plus quinoa.

A decade ago, the area's farmers listed climate change as the most prominent factor affecting changes in agriculture in the early 21st century (Campbell, 2006). Indeed, glaciers on Mt. Cotacachi stopped being permanent sometime between 1997 and 2004 based on longitudinal aerial photographs (Rhoades, Zapata Rios and Aragundy, 2006). As part of the multi-year interdisciplinary Sustainable Agriculture and Natural Resource Management-Andes project from mid-1990s to mid-2000s led by the late Bob Rhoades, I worked on comparing Andean Cotacachi with other human-inhabited ecological zones in terms of people's perceptions of the landscape and the role of migration in creating rootedness and agricultural continuity (Rhoades, Martinez and Jones, 2002; Flora, 2006; Jones, 2002).

⁹ I presented a version of this paper to the *Climate Change and Local Knowledge* workshop held by the project team in Verona, Italy, 11-14 March, 2015.

¹⁰ The project is led by Giovanni Berrardo, but the specific award for the Ecuador portion of the research is NSF-BCS 1330070.

Methodology.

Data Collection. Alicia Guaján—a resident of the village Alambuela—and I conducted this research with Quichua-speaking farmers in Alambuela near the city of Cotacachi. We conducted interviews with 23 individuals from different families out of the roughly 40 households. All of these families engaged in farming activities, although farming was not the only productive activity for some of the families. We stratified the sample by the following characteristics and attempted to have equal numbers of each: irrigated and not irrigated, young and old, male and female, and smaller vs. larger landholdings. These are relevant for the following reasons:

- Irrigation is likely to be affected by climate-induced hydrological changes (Viviroli et al., 2010), and because water distribution is unequitable
- Age is a proxy for cosmopolitan interests, greater desire for cash/money, and loss of ecological knowledge
- Gender is a basis for a moderate division of labor in agriculture in this area, plus men are more likely to work off-farm for pay
- Land size is a proxy for degree of financial investment in agriculture and also for financial resources for dealing with change

In order to access explicit knowledge (e.g., facts, details, stories), as well as implicit knowledge (e.g., general perceptions, senses of things) and unconscious knowledge, our research into cultural models of nature will employ several data collection techniques. This report only contains data collected through the semi-structured interviews (see Appendix A). The team members used the semi-structured interview guide in each of the sites, but tailored the interviews to follow up on issues important to locals as well as additional interests of the investigators in each site. Alicia Guaján translated the interviews in Quichua in all but one of the interviews, which I conducted in Spanish. We digitally recorded the interviews, and Ms. Guaján also transcribed the interviews and translated them into Spanish.

Data Analysis. To capture the most important facets of these Cotacacheños' understanding of environmental change, I counted themes present in the interviews. I mainly counted themes from the questions covering changes and challenges in agriculture, the effects of weather changes, the nature of weather changes, and agency of humans. For any identified theme, I counted each individual a maximum of once per theme; thus, the maximum count for each theme being expressed is the same as the total sample size (n=23). I mainly report on themes counted among at least 10 of the 23 informants. In a few cases, to be illustrative, I included some subthemes that are not present in 10 or more interviews when the overarching theme was present in at least 10 interviews.

The sections “Perceived Environmental Changes” and “Local Interpretations of the Changes” are the more descriptive parts of the report in an attempt to report summary data without my interpretation. The sections “Hypothesized Cultural Model of Nature” and “The Structure of Causality” rely on my analysis of these data in seeking to capture a cultural model and to synthesize the major causal statements made by the informants.

Perceived Environmental Changes.

Without fully defining what is part of the environment in the minds of these Quichua-speaking highlanders, I want to note that environment is my analytical concept, not theirs, and that we sought to get them to talk about—in relation to their agricultural activities—how they think about plants, animals, weather, landscape features, supernatural, and people. Through the semi-structured interviews about agriculture and the changes in their lives, the kinds of things they talked about were weather, plant/animal pests, people (knowledge, labor, symbolic activities), chemicals, soil, fire, the mountains (dormant volcanoes), and the wild grassland on Mt. Cotacachi.

In discussing changes in agriculture and problems with these changes, people's dominant focus was that the soil no longer produces like it used to, with a few people more graphically referring to the soil being worn out or tired. Thinking of production somewhat more broadly, and including this concern about soil, people noted changes as:

- Soil has decreased in productivity;
- A greater lack of water;
- More extreme weather (heat, cold, rain, wind each mentioned several times);
- An increase in microbial and insect pests;
- And shifts in the timing of the weather.

Local Interpretations of the Changes.

When the interview conversation covered why these changes were occurring, the informants provided a variety of answers, but almost exclusively regarding human behaviors. Again, these are approximations or summaries of the informants' statements rather than interpretations of mine.

Human Agency in Environmental Change. Factors producing environmental change include:

- Cutting down trees that would otherwise hold back desertification;
- Burning trees, grassland and crop residues which all protect soil moisture;
- Factories and cities are polluting the planet;
- The use of agrochemicals poisons humans, animals, soil and water, although agrochemicals are beneficial by supporting good levels of production;
- People are disposing of waste and garbage into the waterways and on the ground.

Interviewees also discussed the more moral side of human agency in environmental change. This is what I characterized in the title as living respectfully. "We are to blame," or some version of this refrain, was offered by almost everyone in the sample as to why climate and other environmental changes were occurring. However, not everyone characterized this moral blame in the same way. More specifically, a few to several people claimed each of the following were at play in the environmental changes they were experiencing:

- We have been lazy;
- We are egotistically doing whatever we want;

- We are teaching children poorly;
- We are getting on poorly with others.

While less than 10 people stated so, I found it worth noting that a few people said, “only our God knows why these changes are happening.”

Hypothesized Cultural Model of Nature.

This cultural model relies on analysis of the data from the semi-structured interview, particularly utilizing those sections of the interview discussed above.

1. Humans depend on nature, but specifically humans are given everything by Mother Nature and/or God;
2. Mother Nature responds to care of the earth, but specifically soil must be recharged and cared for and respected;
3. God responds to care of the earth and right living;
4. Sometimes Mother Nature and God are the same, sometimes they are not;
5. Taking care of family is the most important reason for living;
6. This specific region is protected by Mother Mt. Cotacachi and Father Mt. Imbabura;
7. Agricultural production is untenable, unlike in the past;
8. We are to blame for the situation with agriculture and nature.

This cultural model suggests not only causality, as taken up in the next section, but it also indicates some potential overarching dimensions of importance. One dimension is that of ‘give and take.’ People take from Mother Nature, the soil, and God, and they give back through respect, ritual and soil-enriching practices. Another potential dimension of the model is that of ‘wet and dry.’ Seasons are categorized by wet and dry, and great attention is paid to the timing of the rains, the shift in their timing, and the amount of rain that falls.

One of our goals was to capture how plants, animals, landscape/non-biological features, weather, supernatural beings/activities and people interacted within and/or outside of nature. In other words, which of these things are in nature and which are outside nature. These six domains are ours as scientists, and used to improve the systematicity of the research such that even coverage occurs in each of our sites. My preliminary thoughts are that plants, animals, landscape and physical entities besides celestial bodies, all weather, some spirits, and rural-dwelling humans are inside nature. Some saints and bogie men-type spirits probably lie outside of nature, and it appears that urbanites are also considered as outside of nature. The next section deals more directly with the relationships between the specific players in these six domains.

The Structure of Causality.

Taking the themes from the above sections on environmental changes and people’s perceptions of those changes, I created a summary graphic of the causal relationships (Figure 1). The soil is affected by lack of water—because of burning crop residues and cutting trees—by lack of organic matter—because of burning—and by pollution. Factories and pollution seem to be cited to some degree as part of the more global dialogue on climate change, but also based on the idea that people are disrespecting the earth, Mother Nature and soil through pollution. However,

agrochemicals are cited directly as killing microbes in the soil through pesticides, reducing organic matter through herbicides, and more generally poisoning the soil. Finally, both the timing and the extremeness of weather have changed. These may or may not directly affect soil fertility to the informants, but are noted as decreased output—some say because their prior farming knowledge is now less useful because of the changes.

Graphic Causal Model

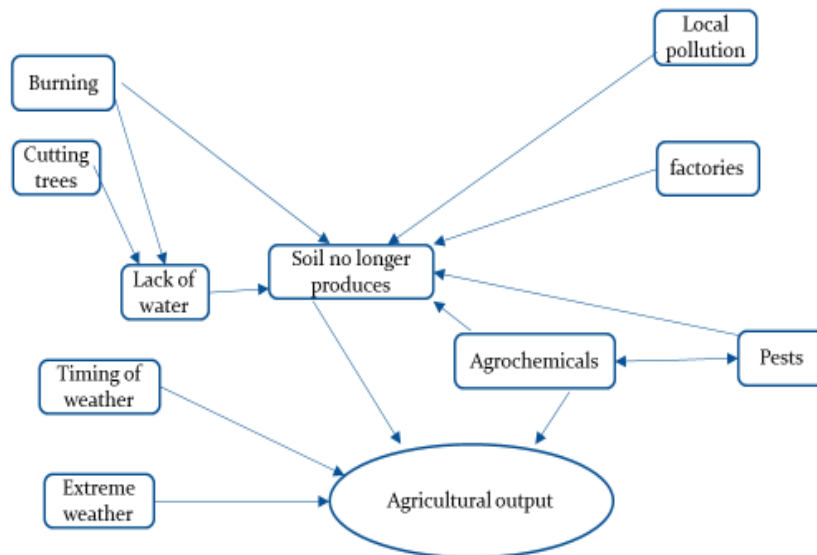


Figure 1. Graphic Model of Causal Relationships.

In seeking to capture the relationship between the six domains of animals, plants, other environmental things, weather, supernatural and people, I transformed each of the enclosures in the above model into one of these six domains, and collapsed them into a set of primary relationships. Since the six domains are the scientists' domains, I have altered the domains to fit local conceptualizations by splitting the spirit world into two parts (God and Mother Nature), splitting humans into two parts (rural dwellers and urbanites), and lumping plants and animals together in Figure 2, resulting in seven locally-responsive enclosures instead of the scientific six.

Summary Cultural Model

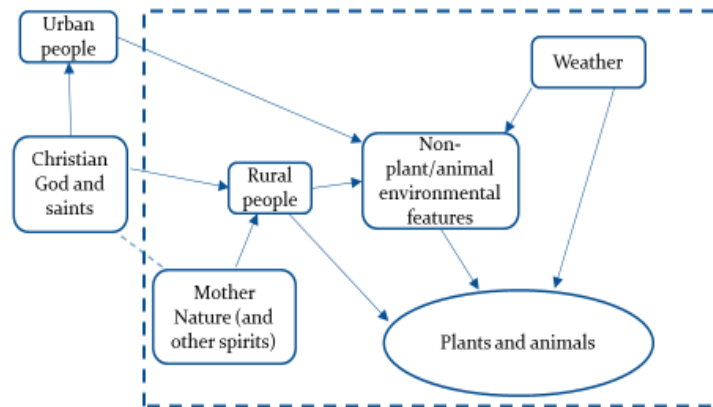


Figure 2. Graphic Cultural Model.

My analysis of the interviews leads me to think that the local cultural model holds that urbanites and God are outside of nature. However, sometimes God and Mother Nature seem to be one-and-the-same (designated by the dotted line between them). Additionally, God provides for people, which might make the deity part of nature. I did not connect mother nature with the other entities of plants, animals, other environmental stuff, and weather because much of the time Mother Nature is seen as the same as those facets of nature. However, Mother Nature is not equated with humans, even rural people, which could suggest that rural people would also be outside nature.

Conclusion.

This hypothesis of a cultural model contains both causality in nature, and dimensionality of the essence of life. At the foundation of this research—of exploring these domains—the question is: In the minds of our informants, can the model of nature exist without each of the six domains we chose? In this case, preliminary results suggest that nature can exist without cities, and nature can exist without the Christian God. This splitting of the spirit world between Christian spirits and Mother Nature (and other spirits), as well as the splitting of humans into urbanites and rural dwellers undoubtedly creates some cognitive dissonance, and may partially be influenced by the common Christian and Western dualisms. However, these differentiations between kinds of spirit worlds and kinds of human worlds also gives the opportunity for people to be able to switch from one life to another, or to identify their existence with the cultural model that is convenient or appropriate at a given time. This perhaps occurs in many or all societies, but may also be indicative of the social and ecological changes these informants are experiencing.

Acknowledgements.

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**Like a Bonsai Tree:
Models of Food Production and Nature
in the Northern Kanto Plain of Japan**

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Introduction.

While the Japanese islands have been prone to a variety of natural disasters throughout the history, the magnitudes of some of these omnipresent threats are observed to have increased in recent years. My informants, for example, anecdotally spoke of perceived increase in the temperature throughout the years. The relatively cool rainy season which lasted from the middle of June into July, which used to require heating equipment, turned into “wet summers.” They also talked about orange trees they planted that used to produce sour flavors now yielded sweeter flavors presumably due to the warmer climate.

Relatedly, storms of many kinds are reported to have intensified in recent years. In the past, the term tornados were unheard of, but today they are new and frequent occurrences. Other severe storms are accompanied by larger hails than in the past. In fact, in the winter of 2014, the year this fieldwork took place, the eastern Japan, including Tokyo, experienced record-breaking snowfalls. As a result, many of the informants’ green houses were destroyed.

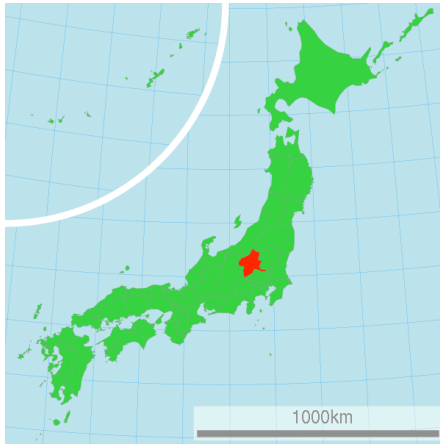
Yet the informants appeared composed and nonchalant about the effects of these changing climates on their food production. Most of them did not bring up the topic during the interviews until they were asked specifically about it. What could be some of the reasons for this? For one, the general increase in temperature and the intensity of the rain and snowfall has not significantly affected the informants’ “outdoor crops,” which are predominantly rice and wheat. The majority of other products, mainly vegetables, are produced indoor. The destruction of the green houses due to the record amount (over two feet) of snow was a major loss. Nonetheless, the informants seemed to have accepted the incidence as a by-gone, and showed a sense of gratitude toward the Japanese government, which helped cover about ninety percent of the loss. Such is a reminiscent of the way the people of northern Japan reacted calmly to the calamity of the *tsumani* in 2011 (Kingston, 2012).

What implications do these preliminary observations offer in terms of “cultural models” that are purported to have influenced the informants’ narratives about food production? I hypothesize that the informants relied on an overarching cultural model that nature can be “humanized” to enhance human endeavors particularly in the areas of self-cultivation and associated interpersonal relationships. Using this cultural model works as a buffer against and around which to circumvent the perceived and real harms of raw, untamed nature. According to this cultural model, raw nature is *un-natural*. Nature is “natural” only when it is humanized to enhance human existence and activities (Pelzel, 1974; Lebra, 1976).

Research Site.

The data was collected in Gunma Prefecture (first map, highlighted in red), which is in the northwestern tip of Kanto Plain (second map)—the largest flat land in Japan spreading southeastward toward the Pacific Ocean. The southern section of Kanto Plain includes the Greater Tokyo Metropolis, the largest urbanized and industrialized region of the nation. Gunma’s

climate, location and landscape make it an ideal place to produce many types of agricultural products (Shimizu, 2012).



Gunma's topsoil is made of volcanic ashes that accumulated over the centuries. The mountain range on the north blocks the moisture traveling from the Sea of Japan, causing much precipitations—in the form of rain in the summer and snow in the winter—on the “back” (northern) side, giving Gunma the most sunny days per year in the nation. Gunma also has varying levels of altitude created by the mountain range gradually tapering down to the Kanto Plain. This allows the food producers to alter the growing temperatures by switching the altitude on which the crops are planted. When combined, the fertile volcanic soil rich with minerals, the temperate climate, and the terrace-like farming fields produce nearly ideal condition for producing a variety of agricultural products. As one informant spoke of Gunma as a “farmer’s heaven” where “you can produce many different kind of products within very little proximity.”

Participants.

The participants come from two of the most populous cities in the prefecture: Takasaki and Maebashi which annex to each other and are centrally located in the prefecture. I asked two of my high school friends (I am a native of Takasaki) and my mother to recruit farmers they knew. After obtaining a few leads, I used snowball sampling method. I had a total of eighteen participants. The sample was skewed toward older males with high school education (i.e., the modal pattern): 13 males and 5 females; ages 29 to 66 with the mean of 55 (11 out of 18 reported). Of the 8 out of 18 who reported their educational backgrounds, one had a four-year college degree, one had a junior high degree, and the rest (6) had high school degrees.

About half of the participants produced rice and wheat (collectively referred to as *bei baku*, i.e., rice and wheat). All of the rice and wheat farmers grew a variety of other vegetables (e.g., cucumbers, lettuce, tomatoes, daikon, etc.) because rice and wheat required relatively little care in between the planting and harvesting seasons. The remaining half produced specialized products which included plums, pears, tomatoes and pigs. One specialized in farming a variety of organic vegetables.

Methods.

The fieldwork took place during a four-week period between May 21 and June 18, 2014. The methods included: nature walk with open interviews, semi-structured interviews, free-listing tasks, and space tasks (the analysis of the last two data are in progress and not included). All four processes were videotaped, and the semi-structured interviews were transcribed by Japanese native speakers in the field. Below, I will first outline what the participants saw as factors leading to successful food productions based on the results from the semi-structured interviews. Then I will speculate about the cultural models of nature on which these responses were based. Finally, I will formulate working hypothesis to be tested in future studies.

Factors Leading to Successful Farming.

Japan being a highly industrialized society with complex economic systems, none of the informants engaged in subsistence farming. Their farming did not rely directly or solely on naturally given soil conditions or weather patterns. Instead, they utilized advanced in-door food productions facilities and technologies. They also took an advantage of the wealth of current, and research-based farming knowledge provided by the municipal and national farmers organizations such as JA, Japan Agricultural Cooperatives and their local representatives. Farmers also exchanged ideas and tips with other farmers, which they acquired through experience or the sources mentioned above.

As to what makes plants and animals grow, informants shared basic knowledge which they saw as fundamental to successful farming: i.e., knowledge about optimal soil conditions (via appropriate fertilizers for plants and foods for animals), lights, winds, temperatures, timing of planning and harvesting and other maintenance activities (e.g., pruning), and ways to prevent diseases. They said such knowledge comes from experiences, other farmers including their parents and family members, the government-based, local and national farming bureaus such as JA. No one mentioned supernatural factors such as “gods” or “spirits” as factors contributing to the growth.

In terms of their business success, informants revealed two distinctive yet complementary models. The first model may be called rational and profit-oriented. Here the food producers worked in concert with the information provided by JA about the crops and seeds types, kinds of diseases that are prevalent and how to prevent them to maximize their productivity. The JA’s also organized chains of marketing outlets into which the farmers could distribute their product at a timely fashion. Most of the large-scale rice, wheat, tomatoes, plums and pears farmers relied on such support system.

The second model may be termed non-rational and relational, and even “moral” and “spiritual,” in a sense that it seeks higher level of meaning and satisfactions from the food production than merely generating profit from it. Informants often used the terms *kodawari* (to be particular about in unique and/or perfect quality of something) and *tsunagari* (to be authentically connected with others) to express this view. To *kodawaru* (the verb form of *kodawari*) means to produce foods that bear one’s “signature” heart/effort. Many of the consumers who tasted such foods become “repeaters,” loyal customers who develop a special and lasting tie to the food producers. Many farmers noted that from such special connections they gain most satisfactions out of their job. In short, the first model is essential because without it, farmers cannot sustain their livelihood. The second model complements the first as it helps them

to create deeper and more personalized meaning of their work. Below are individual examples the second perspective from the semi-structured interviews and the nature walk activity.

Individual Cases.

Michiko Sekiguchi, a sixty-four year old woman, married into a multi-generational farming family. While her husband takes charge of the rice and wheat, which supports family's main income, she grows greenhouse tomatoes, along a variety of other green vegetables. She says her operation is "small" and "not profitable," but it has motivated her to continue for the last eighteen years. Asked why, she responded, "It's [my] *kodawari*."

Asked to explain what *kodawari* means to non-Japanese, she said, "it means to be particular [about your mission] and not to compromise (*kotte iru*).” In a practical term, it means to...wake up at three or four in the morning every day” to take her vegetables to the local stores. “That way, people say when they eat my vegetables, *oishii!* (delicious). You must pick them first thing in the morning and have people eat that way. I especially want young children to know how great they taste.”

Another expression of Michiko's *kodawari*, in addition to always hand delivering her vegetables fresh, is the farm stand she created for herself, which she named, *Daichi No Megumi* (The Earth's/Land's Blessing/Abundance), the same brand name that the rice they produce bears. The space is filled with wall hangings and gifts she received from her (female) friends. Secondly, she sells the vegetables she produced at low prices. The room symbolizes her connection with other female farmers.

It is also worth noting that this farm stand is located next to the family grave. Michiko feels a deep gratitude that she and her husband inherited the land that their (the husband's) ancestor cultivated. She says, "I know how our ancestors were attached to this land, and never thought of letting go. When I think of their feelings, I, too, cannot let go of this land." During our 'nature walk' around the family grave, she said, "this is a reminder for me that our ancestors are always looking over for us." Michiko's meaning in farming is thus embedded in the context of human relationships.

Shinji Amada is a thirty-two year old pig farmer who also took over the business from his father, who inherited it from his father forty years ago. As a third generation entrepreneur, Shinji strives to create a brand that is unique to him. He said that such goal is a norm in the Japanese big farming business, which contrasts with the quantity over quality emphasis of the Western—i.e., U.S. and Denmark—farmers.

Japanese pig farmers seek "artistry" in their work. They put their "soul" into their products so they naturally become expensive. In the United States and Denmark, they produce one "national" brand. But here have over four hundreds brands of pork. Each farmer wants to produce "something that only [they] can make" (*jinbun shika dekiani*). It's our *kodawari*. This is what is so unique about Japanese pig farming.

As with Michiko, Shinji said he "grow[s] food to make people happy." He continued: "What's the point of being rich if everybody else is not happy... I recently read a book that says never lose the sense of gratitude, and that the only way to get that gratitude is through seeing other people rejoice and smile."

One way to achieve his goal is through the “farm tour” design for school-age children. He wants them to “eye-witness the birth of baby pigs.” He said that the reason for this project is both “philosophical” and “educational.” For him, “to eat means to ‘be given someone else’s life’ (*itadaku*).” He elaborated, “Pigs are like people. They are cute and friendly. To understand that we eat them to be alive is to understand the preciousness of both their and our lives. Hopefully, knowing this creates a sense of gratitude in all of us [to be alive at the expense of pigs’ lives].”

Hikaru Hoshi, age thirty-nine, is another entrepreneur who dropped out of a corporate job in Tokyo to start organic farming in Gunma’s isolated countryside. He grows vegetables free of chemical fertilizers and pesticides. But his *kodawari* is not merely to grow organic food, but “to connect with people...[since] there is still a bridge to cross between the farmers and people who eat what we grow. What the future farmers need to do is to reduce the gap between them.” He visits restaurants and demonstrates how and what to cook with his vegetables: “First, I cook and eat what I grow myself. I try to come up with my own methods of cooking [which I believe makes food taste good]. Then I go to a restaurant, get inside the kitchen and demonstrate what they could do [with my vegetables]. Sometimes I converse with customers. I am a ‘talking farmer.’” All four informants above try to create human connection through the foods they produce. As discussed below, this central preoccupation may have to do with an assumption that un-humanized nature is not “natural.”

Nature and Food Production.

The Japanese word for nature, *shizen* (自然), has two basic meanings: to be “natural”—i.e., to be “spontaneously or naturally so” (Tucker, 2003, p. 161)—and that which pertains to the natural world—the environment and creatures in it (Tucker, 2003; Shimizu, 2012). Accordingly, I attempt to generate some hypothesis about what constitute “natural” (Meaning 1) ways to produce foods via “nature” (Meaning 2).

Using both meaning, I propose a cultural model which states, “nature” is not “natural” until it is “humanized.” An analogy here may be that of creating a *bonsai* tree, the art of producing miniature trees that “mimic” the way they “naturally” grow. This view contrasts with the two other alternative views, that nature is “below” human to be used as *the means to* achieve utilitarian gain, or “above” them in that it is too powerful and beyond human control (e.g., natural disasters).

Takeie Lebra (1976), a Japanese-born cultural anthropologist, citing Pelzel (1974), describes this “humanization” of nature (the middle position above) as follows: [according to the] “Humanism, Japanese style... all elements of the universe be *related horizontally and mutually* (italics added), that they share the same ‘human’ status, rather than being hierarchically controlled with the ultimate keeper of the order at the top” (p. 10). Hereby the “task of [humans] was to make nature civil, removing from it the troublesome qualities of speech, mobility and violence” (Pelzel, 1970, p. 47, quoted in Lebra, 1976, p. 11).

Below are some examples from this study that seems to support this cultural model. As Mr. Hoshi and I drove away from his organic farm after the Nature Walk, he muttered: “Being out there (where his field is) late in the evening, I hear wild animals begin to make noises. At a time like that, I feel that there is a ‘natural’ (i.e. untamed) world out there that is beyond human affairs. I feel that I need to leave there to give it respect.”

Another evidence comes from, Mr. Terada, Mr. Hoshi’s business partner, whose job is to create close producer-consumer relationships mentioned earlier by Mr. Hoshi, noted that there

was a stigma attached to “strict organic farming... People tend to see organic farmers as religious fanatics of sorts... It’s a perception unique to Japan... Organic farmers are seen as being too ‘stoic’ (*suto ikku*), and not in sync with the sentiment of the rest of people.” This “sentiment,” as I interpreted, suggests a belief that food production and consumption must be a two-way, mutually interdependent process between the food producers and the consumers. To produce foods by an abstract principle of the food producer alone, i.e., growing foods devoid of chemicals, is a less “natural” way to produce and consume foods (raw nature) than that which is embedded in the close, interdependent relationships between the food producers and their consumers.

Future Analyses.

The main hypothesis to be tested in future studies is, “Food production, as a process of converting ‘raw nature’ (Meaning 2) into human consumption, has to be ‘humanized’ to be ‘natural’ (Meaning 1).” By “humanizing,” I mean treating nature as an equal of human beings ontologically: i.e., rather than being below humans (objectification) or above them (*super-naturalization*). Nature in its “natural” form resides in the realm of human society and relationships, particularly in the context of interpersonal relationships. The verification process may include the following methodologies.

- Frequency analysis of key terms such as *kodawari* (to be particular about in unique and/or perfect quality of something) and *tsunagari* (to be authentically connected with others).
- Gist analysis followed by cultural models analysis (D’Andrade, 2005) of the interviews data.
- Analysis of the inter-relationships between the frequency analysis and cultural models results.
- Metaphor analysis (Quinn, 2005) concerning the process of food production, marketing and consumption.

Summary.

The initial phase of this project that aimed to discover cultural models underlying discourses of food production in central Japan shows a pattern calling for *human intervention* for successful food production. Furthermore, the need for human intervention appears to be underscored by a belief and a cultural model that raw nature must be “humanized” on relational terms to be cognizant in the local context. To validate this hypothesis, it needs to be verified further by methods such as frequency analysis, cultural model analysis and metaphor analysis (See D’Andrade, 2005 and Quinn, 2005, for example).

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**Flowing Between Certainty and Uncertainty Rhythmically:
Spirit's Power and Human Efforts in a Kachin Cultural Model of Nature
in Southwest China**

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[Abstract]: Using the concept of cultural model, I examine how the ethnic Kachin in Southwest China conceive of nature and climate change. I begin with the local scheme of time that captures the causal relationships among people, the supernatural, and physical environment into a rhythmic pattern. The Kachin seek a synchronization between these rhythms and their activities: the seasonal rhythm defines their activities within a year, and the local divination table specifies those within a day. As such, a synchronization can be easily broken by human desires that expand excessively. The Kachin have also developed techniques to maintain, or to make up, the synchronization through the local religious tradition of animal sacrifice. In bad situations, when synchronization has been broken deeply, nature and the climate will move away and humans are left behind.

One hot afternoon, on the way to my Kachin friend's walnut field on the mountain side, we walked along a business road that heads to Burma for about an hour. My friend, a college graduate in the 1960s from a local university, now in his early sixties, had worked in the local government for about ten years, and then came back to live in his village as a farmer. He told me that five years ago he had planted a lot of Amomum tsao-ko (a spicy ingredients favored by many Chinese) and gotten a lot of money. The Amomum tsao-ko requires a shaded (cool) and damp living environment. "Before, my field was perfect for planting Amomum tsao-ko. It is close to a river bed and well shaded by big trees. It is also near the business road making my work much easier." He is much nostalgic for his good life with decent income in the old days, when the temperature was not so high in the region. "Now, the weather climbs up along the hills, and our village and field become hot. My Amomum tsao-ko grows very well, but bears no fruit. This year, my son's father-in-law gets big money from his Amomum tsao-ko field." His son's father-in-law lived in Xima, a village tract about 3 hours' bus away, where it was well known for its poverty and cold weather on the top of the mountain. No crops grew well there, "even the ear heads did not bend down! But now, our weather has moved up there, while the weather at valley moved up to our village and field." He sat on a stone on one side of the road, seeming to become too weak to walk. "It seems that the altitude of my place has been lowered down. The weather has moved away, and animals have done so. They went to Xima or Burma. Plants cannot move. They die or grow rapidly without bearing fruits. Before, we Kachin moved along too, but we are stuck here now [by the Chinese Hùkǒu system¹¹]." He concluded. [8/4/2015]

He also explained that nature and climate move rhythmically. Before, humans read signals from nature and followed the rhythm. "We read our divination table no matter what we did, so we knew the right time for the right thing." But nowadays, humans have excessive desires and do not follow nature. Nature is rhythmic and so knowable, while human desires are endless and unpredictable. Humans follow their desires, and the gap between the certainty of the natural rhythm and the uncertainty of human desires is increasing continuously. As my fieldwork proceeded, I came to realize how my friend's view illustrates the local views of nature and the environment.

¹¹ The Chinese system of Hùkǒu was established in 1951 and extended in 1955 to regulate the movement of people within China and the redistribution of economic and social resources such as legal residency, housing subsidies, land, medical care and education.

In this paper, I elaborate on these views using the concept of cultural model (Bennardo 2009, 2010; Kronenfeld 2008; Strauss and Quinn 1997). I base my examination upon Kachin villagers' basic notions and principles of the local religious and medical tradition of animal sacrifice, which serves as the primary resource for attributing causes for major problems. Animal sacrifice saves human life by sacrificing animal life to spirits that make people ill. Spirits penetrate people's lives. They allocate preordained fates to individuals, shaping the latter's life, death, achievements, and even the afterworld life. They circumscribe details of people's actions, such as when and where one might go so as to avoid bad fortune. In this regard, animal sacrifice captures basic causal relations among a number of fundamental and constitutive categories such as people, animals, plants, weather, physical environment, and the supernatural (c.f., Atran and Medin 2008). I describe this causality in terms of the local scheme of time. In specifying this scheme of time, I propose a Kachin cultural model of nature and environment, and in particular, of climate change.

The Kachin live astride the borders of Burma, China, and India¹². They were once well known in the anthropological literature owing to Edmund Leach's classical study (1954). From 2003 to 2011, I conducted 32 months of fieldwork, mostly in Sama village and its four neighboring villages (Luding, Lagat Ya, Big and Small Maru) in Tongbiguan Village Tract, Yingjiang County, Yunnan Province. In 2014, I conducted intensive interviews with 60 villagers (including eight religious specialists, some government officials, and people who are fluent in Chinese and Kachin and those who speak only Kachin; male: female = 2:1, Christians: non-Christians = 1:2). These villages have been inter-connected by marriage for hundreds of years. There are about 500 adults total, with over 90% ethnic Kachin. Sama is a Kachin cultural center in China. One of the two greatest specialists of animal sacrifice in Tongbiguan Village Tract lives there. Before 1953 when the Chinese Communists took the Kachin Hills, Sama was the headquarters of the most powerful Kachin chief in China (the *Nhkum³¹ Du³³ Wa³³*)¹³ who controlled most areas of today's Yingjiang and Longchuan Counties. Currently, the Jianbian Administrative Office (the local lowest governmental office) is located in Sama, controlling Sama and its four neighboring villages.

Following the Certainty of Nature: Temporal Rhythm as the Local Causality.

When talking about their relations with things in the world, ordinary villagers always refer to the time/rhythm of the world, while religious specialists refer to the divination table (see the following section). In interviews, the most frequently used words by villagers are: time/rhythm, spirits, and flow. Villagers organized the relations among these key words in the following way: Everything in the world flows following its rhythm, gradually and continuously, and humans are supposed to follow this rhythm, or otherwise, be left behind; climate will move away, so will do animals, and plants will die (for a detailed discussion on spirits, see the following section).

¹² The term Kachin refers to a congregation of a variety of subgroups. In China, they are known as Jingpo with a population of 100,000 or so and as one of the nation's 55 officially identified ethnic minorities. In India, they are known as *Singhpo* with a population of several thousand. For the classical ethnographies on Kachin in English see Carrapiett 1929; Gilhodes 1929; Hanson 1913, and in Chinese see YNSBJZ 1985-86.

¹³ The Kachin Orthography used in this paper is consistent with the standard Kachin, namely, *nhkum³³ ga³¹* (Kachin spoken in the political domain of the *Nhkum³³* chief, in today's Tongbiguan Village Tract, Yingjiang County; *ga³¹* means "language"). Four tones of Kachin are marked by 33 (mid-level); 31 (low falling); 55 (high-level); 51 (high falling). For details see Xu *et al.* 1983.

In our conversations about things in their living world, both natural and human-made, the most obvious illustration villagers referred to is the rhythmic alternation of the rainy and wet seasons, and concomitantly, people's activity pattern. A year starts from the dry season, and the alternation of the dry and wet seasons establishes the local cycle of agriculture. The twelve months of a year are evenly allocated into six units, with three in the dry season and three in the wet season. The first unit, *Ma³¹ji³³ Ma³¹ka⁵⁵ Ta³³* (October and November in the Chinese Lunar calendar), is for harvest and celebration (*ma³¹ji³³ma³¹ka³³*: to celebrate; *ta³³*: month). The second unit, *Hkru⁵⁵ Ra³³Ta³³* (December and January), is the period in which everyone has enough food to celebrate the New Year and always feel full after the harvest (*Hkru⁵⁵*: being full; *ra³³*: being ordinary or average as all people get almost the same amount of rice). The third unit, *Wut³¹ Sha³¹la³¹ Ta³³* (February and March), is the period for planning and starting a year's agricultural work (*wut³¹*: to plan a whole year's work; *sha³¹la³¹*: to begin the work with cutting a swidden field). The dry season is dry and cold and things fade and die. It is men's time, beginning with men's killing of small animals (chickens and small pigs) in making sacrifice to spirits and praying for fortune and protection for their trading trips. During the major part of the dry season, men conduct business far from home. The dry season ends when men come back home and sacrifice big animals (pigs and buffalos) to spirits for thanking them and for seeking blessing for a new cycle of cultivation in the coming rainy season. In these activities, men narrate history, chant genealogy, and read the divination table to identify proper periods for specific activities.

As people have planned their cultivation, the rainy season comes. Its first unit, *Ja³¹htum³³ Sa³¹ngang³³ ta³³* (April and May), is the period for planting seedlings in the paddy fields and corn in the swidden fields (*ja³¹htum³³*). When seeds germinate, people will tell how well they may grow (*sa³¹ngang³³*). In the second unit, *Shi³³ Ma³¹ri³³ Gup³¹ Shi³³ ta³³* (June and July), it rains hard, making the work in the field difficult. Initially, the rain flies with the wind, and crops do not bear ears (*shi³³ ma³¹ri³³*). Later, the rain falls perpendicularly helping crops bear ears, and people who plant early can anticipate the harvest (*Gup³¹ shi³³*). The third unit, *Gup³¹ Tung³³ Ka³¹la⁵⁵ Ta³³* (August and September), is the period in which crops fully bear head (*gup³¹ tung³³*) and people feel satisfied when a harvest is anticipated (*-la⁵⁵*: "happy"). The rainy season is wet and hot. It is the time when women grow gardens, gather wild vegetables, exchange agricultural products in the local markets, and exchange gifts among relatives, etc. A female is thus considered as the guardian of all kinds of corn seeds (*n³¹hpro³¹ n³¹hkye³³ ga³¹nu³¹*: *n³¹hpro³¹* and *n³¹hkye³³*, respectively, white corn and red corn; *ga³¹nu³¹*, mother). As most rituals for planning cultivation have been conducted by men at the end of the dry season, the rainy season, short of rituals, is under the plans made in the dry season.

In the old days, humans followed this natural rhythmic alternation maintaining synchronization between their activities and the environment. However, such a synchronization has collapsed since the 1990s when the Chinese government sponsored a series of development projects for removing poverty among the Kachin. In Sama village, the local administrative office allocated government-owned mountain sides to households in 2007, with each getting about 200 hundred "mü" (a Chinese unit of area, 1 mü= 1/15 hectares). The local government encouraged villagers to cultivate cash crops (such as walnut and coffee) and commercial woods (like the Chinese fir) providing them free seedlings. In 2008, the local County government even issued usufruct certificates to ensure villagers' possession of what they had planted in the mountains.

These projects brought villagers a more comfortable material life; however, they broke villagers' attachment to their motherland and the balance between humans and everything else in the world. The allocation changed the local yearly cycle of work and relaxation. Before the

allocation, the rainy season was the time for the mother land to produce, and the dry season for cultivation, harvest, and trading products of the mother land. After the allocation, villagers became extremely busy in cultivation during the rainy season. They do not leave time for the mother land to produce and restore her vitality. Worse, the cultivation stimulated people to extract money and profits from the mother land in all possible ways. Villagers seemed to take the mother land as their own and destroyed all other creatures' dependence on her. Whenever they feel it necessary, all trees in a field would be felled and shrubs be burned with only a small amount of cash crops left. Big animals have run into Burma and small ones become fewer and fewer. Pesticides, which were never used in the mountains, have been widely used. Villagers were surprised to find that one single sick plant might wipe out all plants in a plot, whereas they had seen in the old days one type of dying plant would not harm all others around it.

“Now, we do not care about the time/rhythm; we focus only on money. So, the weather moves away, so do animals.” This is what most villagers frequently said when talking about the current climate change. In addition, the market has also expanded their desire excessively. “The market is a wandering witch spirit!” Many villagers always cited this interesting metaphor in talking about the market. As the witch spirit enables its mediums to gain power while estranges them from all others, the market generates a similar ambivalence between the development of economy and the degeneration of the environment.¹⁴ The market is always wandering around, expanding everyone's desires.

Regulating the Uncertainty of Human Desires in Reading the Divination Table.

Although women and ordinary men referred to the seasonal rhythm in talking about their relations with things in the environment, religious specialists (mostly men) and other knowledgeable men mentioned the divination table more frequently (see the table 1). These men added one more keyword to the Kachin view of nature and the environment: human desires. Their reasoning goes like this: humans have desires and expectations, and how should we regulate our desires by the natural rhythm? It is easy to follow the seasonal rhythm, but how should we act in our daily life? The divination table tells the secret by which humans divine the fortune, “manage their desires, and regulate their activities.” The table constitutes the local idea of causality, specifying one's life and death, sickness and health, fortune and fate in terms of the temporal features of human activities. Interestingly, according to the users of the divination table, it is the human manipulation of the divination table that activates and unfolds the rhythmic flow of the world.

The divination table derives from the local oral history that constitutes the ultimate source for legitimizing villagers' daily life. History is called *la³¹bau⁵⁵* in Kachin, and history telling is to “trace the origin of things” (*la³¹bau⁵⁵hka³¹*; *hka³¹*: “to tell by tracing the origin”). The genesis

¹⁴ The Kachin idea of witch spirit implies a hereditary bad fate. The spirit transmits from parents to children and between sex partners. The possessed people are said to have evil eyes or hands, and the possessed families have a hereditary bad fate. When a possessed person envies others, by pointing at, or watching people or something else with interest, the witch spirit will “bite” the envied person or kill his/her livestock at night, either spontaneously or sent by its medium. To recover, the victim has to make a secret sacrifice to it. However, the sacrifice relieves diseases only temporarily, rather than removing the spirit's surveillance. To sever the surveillance means to kill the whole possessed population, which the Kachin ancestors had tried to do but failed. The only practical way to eschew the spirit while not provoking it is to prohibit marriage with the possessed people. In this sense, the metaphor of the market as a witch spirit indicates villagers' ambivalent views toward the market; though the market brings them money and a new life style, it endows a new bad hereditary fate to them—they are now captivated by their desires.

chanted by the specialist of the highest rank is referred to as “history from the beginning to the present” (*gin³¹ru³¹ gin³¹sa³¹ la³¹bau⁵⁵*). Lasting three days and nights with interruptions only for eating and drinking, it narrates the creation of the sky, the earth, and everything in between.¹⁵ Each phase of creation is marked by the procreation of a couple consisting of spirits and/or humans. Accordingly, the genesis is essentially a Genealogy of Everything; everything is hung on a certain position in the Genealogy and so is set in a web of relations with everything else. As all things are genealogically, or mythologically, connected, history (as genesis) is considered the source of human development. It possesses power that legitimizes practices, reason that justifies current life conditions, and sources that facilitate life experience. Therefore, the Kachin are prone to attributing everything to history, tracing back to its position in, and relations with, all other things within the Genealogy. However, in reality, only a religious specialist of the highest rank could specify these complicated relations among everything. In daily life, ordinary villagers resort to knowledgeable men who read the divination table, a categorical elaboration on the Genealogy of Everything, to acquire information on activity patterns of everything so as to plan their activities accordingly.¹⁶

As shown in Table 1, the divination table classifies relations among everything into five categories (represented by five symbols: one circle, two circles, a cross, four circles, and a blank). These five symbols capture five sets of relations prescribed for all possible existences in the world, as each symbol is associated with an unlimited number of properties, meanings, and relations, such as time, directions, colors, shapes, spirits, order, and numbers, etc.¹⁷ A real-life event results from a specific configuration of these factors. As associated factors are unlimited,

¹⁵ The whole legends were published in both Chinese (Li *et al.*, 1991; Xiao, 1992, 2008) and Kachin (Htoi man, 2001; Xiao, 2008).

¹⁶ In addition to the use of the divination table, ordinary people also read signs directly from nature to plan their activities. Villagers told me dozens of omens by which they tell villagers’ fortune. For instance, when the sun has aura, the chief will have bad situation, or even death. Or a weasel, which always runs away when seeing people, jumps on the trees near a person, which will indicate that one of the person’s relatives will die soon.

¹⁷ Categories and relations associated with symbols are specified as the following.

Symbols	Meaning	color	Birth-order	shape	spirits
blank	nothing	white	1 st	quadrate	Spirits from a died human baby at or shortly after birth (<i>nbya nat</i>)
o	Single	Greyish red	2 nd , 3 rd	spherical	Wide spirits such as <i>maro</i> , mountain spirits in the forest, etc.
o o	A few	green	2 nd , 3 rd	long	Spirit from a stillbirth, mountain spirits around village, the thunder spirit
o o o o	Many and complex	Black, green	4 th and above	Round with a Raised surface	Household spirits, the witch spirit, the mountain spirits
X	Mostly bad	red	1 st	scraggly	Bad death spirits from a bloody death

These associations are essential for using the table for divination. I do not need to explain all these in the text. I prefer to explain only necessary associations for understanding certain details of a specific divination cited in the text. I provide all associations here as a reference for interested readers.

the number of their configurations is also infinite (the number of permutations among factors increases at an exponential rate as the number of factors increases). The table thus provides a categorical outline that classifies countless real-life events in the Kachin cultural world into five kinds of interactional patterns and correlations.

In addition, the table maps the recurrence of the five categories onto the cycles of five days of the lunar calendar. A column represents a day and a night, and a row represents the period of about two hours and a half; therefore, a cell represents a period of time within a specific day. A day and a night is further divided into two sets of five periods (one set from the first row going up to the fifth, and the other, going down from the fifth to the first). In reading the table, the diviner sits facing East, the direction of life and sunrise, as apposed to the West, the direction of “going back to the old home (of ancestors)”. The order of the reading starts from cell 11 (about 08:00 of the first day of each month), moves up to cell 51 (20:00 of the same day), and down again to cell 11 (before 08:00 of the following day).¹⁸ The time of 08:00 of the following day starts from cell 12, and so on iteratively. Once a cycle of five-day has been completed, the calculation starts again from cell 11.

Each cell is associated with a symbol and a cell meaning (expressed by words contained in the cell). The meaning of a symbol is fixed, representing the recurrence of the five sets of relations. Cell meanings, by contrast, were added long after the table was created. They are subject to personal interpretations. An event is thus programmed in terms of known factors (associated with a symbol) and the contextual factors (personal interpretations of the cell meanings). Enabled by the table, people infer future events from known patterns of event occurrence, both rigorously (due to fixed symbol meanings) and contingently (due to personal interpretations). In particular, the table provides a means for divination, or for identifying a proper time for activities. If the purpose of a planned activity matches the properties of a symbol and a cell meaning, people who carry out the activity in a period associated with that symbol and cell meaning will gain benefit and avoid bad fortune.

¹⁸ Precisely, the ten periods of a day and a night in the divination table are specified according to the place of sun in the sky: 1) *ma³¹nap³¹* (sunrise, 8:00 – 10:24); 2) *Chying³³Lo³¹Tsan³¹* (near noon, 10:24 – 12:48); 3) *Shing³³Tung³³* (noon, 12:48 -- 15:12); 4) *Jan³³Ga³¹yau³¹* (the sun leans toward mountains, 15:12 – 17:36); 5) *Jan³³Shang³¹* (the sun falls into mountains, 17:36 – 20:00); 6) *ning³¹rim³¹* (evening into dark; 20:00 – 22:24); 7) *ning³¹rim³¹ga³¹ba³¹* (evening proper, 22:24 -- 24:48); 8) *yup³¹tung³³ga³³* (late night, 24:48 – 3:12); 9) *hpung³¹tsing³³ganon³³wa³¹sai³³* (rooster will crow, 3:12 – 5:36); 10) *nhtoi⁵⁵ma³¹hka³¹* (daybreak; 5:36 – 8:00).

Table 1: The Divination Table

		West					
		1 st , 6 th , 11 th , 16 th , 21 st , 26 th	2 nd , 7 th , 12 th , 17 th , 22 nd , 27 th	3 rd , 8 th , 13 th , 18 th , 23 rd , 28 th	4 th , 9 th , 14 th , 19 th , 24 th , 19 th	5 th , 10 th , 15 th , 20 th , 25 th , 30 th	
5	17:36 – 20:00	<i>Hpung</i> O <i>Chyut Ten</i>	<i>Hka Long</i> OO <i>Ginsup Ten</i>	<i>Tsa Na Ten</i>	<i>Hkai Li</i> X <i>Hkai Ten</i>	<i>Ding Hku</i> OO <i>Li Ten</i> OO	
	20:00 – 22:24	Time for asking each other to go home	Time for hurting people by using sorcery	Drunken time	Time for planting seeds	Time for being pregnant	
4	15:12 – 17:36	OO <i>Baren Num</i> <i>Lu Ten</i>	<i>Hpyen Sum</i> Ten	<i>Lu Sat</i> X <i>Ten</i>	OO <i>Shingai Lu</i> OO <i>Ten</i>	<i>Lawa Shan</i> O <i>Sha Ten</i>	
	22:24 – 24:48	Time for having a dragon wife	Time for being defeated	Time to kill	Time for baby-delivery	Time when wild people eat meat	
3	12:48 – 15:12	<i>Htong Hkat Ten</i>	<i>Jo Sat</i> X <i>Ten</i>	<i>Hka shaton</i> OO <i>Ten</i> OO	<i>Mason Chyu</i> O <i>Ten</i>	<i>Hkring Ga</i> OO <i>Nong Ten</i>	
	24:48 – 3:12	Time to be imprisoned	Time to kill by using poison	Time when water is level in all directions (in a balanced state)	Time to be jabbed by a spear	Time for religious chanting	
2	10:24 – 12:48	<i>Hpyen</i> X <i>Rot Ten</i>	<i>Hko Hkam</i> OO <i>Mying Lu</i> OO <i>Ten</i>	<i>Sharo Shan</i> O <i>Sha Ten</i>	<i>Ganu Gawa</i> OO <i>Hkong ten</i>	<i>Nam Dum</i> <i>Hkrat Ten</i>	
	3:12 – 5:36	Starting time for a war	Time for naming a prince	time when a tiger eats meat	Time for meeting parents	time for falling into a latrine	
1	8:00 – 10:24	OO <i>Hko Ya</i> OO <i>Hko La</i> OO <i>Ten</i>	<i>Hko Hkam</i> O <i>Tai Ten</i>	<i>Gumhproi</i> OO <i>Bum</i>	<i>Nta Du Wa Ten</i>	<i>Htung</i> X <i>Pru Ten</i>	
	5:36 – 8:00:	Time for giving each other benefit	time for enthroning a prince	silver mountains	Time for going home	time for being set free from a prison	
		1	2	3 East	4	5	

Traditionally, humans turned to the divination table to regulate their activities, namely, to tame their desires and modify their expectations. Nowadays, desires and expectations, stirred up by the Chinese government’s projects for economic development and by the expansion of the market,

have increased so much that the synchronization between humans and the world has collapsed. Worse, the detrimental influences from the government and market are only part of the reason; the tradition of animal sacrifice has also collapsed from its internal core in two regards. First, Kachin now use the Chinese Lunar Calendar, while the divination table is designed according to the Kachin traditional calendar. The Kachin calendar classifies its twelve months into six units, with three in the dry season and the rest in the rainy season, corresponding with the local agricultural cycle. However, the Chinese lunar calendar fits more with the alternation of four seasons. As time scheme defines the fortunes of the living and their relations with spirits, adopting the Chinese lunar calendar dis-enables the Kachin traditional time scheme, and so relations between humans and spirits according to the traditional scheme do not fit with the new scheme. As a result, people lose the ability to anticipate spirits' activities, failing to plan their activities accordingly.

For instance, according to the Kachin calendar, a year is evenly apportioned into 12 months with each having 30 days, and dates are differentiated according to the phases of the moon and its locations in the sky. The Chinese lunar months have different numbers of days for months, creating discrepancies between the calendar and the divination table. For a month of 29 days, people are not sure what column the date of the 1st of the following month should correspond to. If it corresponds to the fifth column, the second date will be one day delayed; if it corresponds to the first column, the fifth will be skipped before completing a five-day cycle. The table was designed according to continuous time, but the Chinese calendar breaks the synchronization of the table with the natural rhythm of the world and so deprives it of its power for divination.

Second, another basis for the synchronization of the divination table has been undermined, and the table loses its power to embody the power of life and death and so for divination. The power of life is obtained by the way the table is drawn. Each cell should be drawn in the period it represents so as to embody the fortune of that period. Drawing a table thus takes 5 days synchronizing the table with the fortune of a five-day cycle. The power of death is realized by the material on which the table is drawn. An effective table should be drawn on a particular part of the skull of a bad-death person. The deceased is touched by the power of death, and the part of his/her skull that is used should not touch the earth when s/he dies and falls to the ground. That part is touched by the power of death while not yet belonging to the afterworld, thus mediating between the living world and the afterworld. However, many specialists today do not understand the power of the table. They draw the table on paper at their convenience depriving it of its power for divination.

Flowing between Certainty and Uncertainty Rhythmically: Shamans and its Mediation.

The time scheme characterizes the relations between humans and nature into a rhythmic pattern: the seasonal rhythm defines human activities within a year, and the divination table specifies those within a day and a night. According to these rhythms, people plan their activities and formulate their relations with the surroundings, creating a synchronization among humans, other creatures, and the physical environment. In this process, as human desires may expand and collapse the synchronization, Kachin have developed techniques to maintain, or make up, the synchronization through animal sacrifice. In bad situations, when the synchronization has been broken deeply, nature will move away and humans will be left behind. As many villagers claimed, this is why the Kachin in the past always moved around chasing the climate and environment.

In villagers' daily life, misfortune and diseases are considered as a signal of the broken synchronization, which animal sacrificial rituals are intended to resume. A ritual officiant enters into an enhanced state of consciousness and negotiate with spirits, who manifest the rhythm of the world. The key to this negotiation is the officiant's enhanced state of consciousness based on the Kachin view of the human soul and consciousness (*woi³³nyi³¹*), which, together with the body and life cord (*sum³¹ri³¹ sum³¹dam³³*, it connects the body to the soul indicating one's life expectancy), constitute the four essential components of a complete human life. The soul exists in both the living and the other worlds in two different forms: *num³¹la³³* (the soul of the living) and *tsu³¹ nat⁵⁵* (the soul of the deceased. *Tsu³¹* is the ritual name for the afterworld). The former is attached to the body while the latter is independent of the body and is essentially the same as all other spirits.

According to the Kachin linguist and anthropologist Maran La Raw (2010), the Kachin word "*woi³³nyi³¹*" (consciousness) came as a loan-word from Shan who in turn received it from the Burmese-Pali *wi-nyan*, originally meaning consciousness. Its essence is to express the spirit as a positive force of life, *contra* the force of the spirit of death (the soul). To enter into an enhanced state of consciousness, a ritual officiant should activate the duality of his soul in the chanting so as to have a dialogue with spirit(s): his soul in the living world represents the living to pray to spirit(s) and his soul in the other world embodies spirit(s) to negotiate with humans. In this virtual space of an enhanced state of consciousness, words are not simply words; they constitute effective actions (they are performative in Austin's term, 1962). What the chanter promises to offer to spirit(s) should be rigorously enacted by his assistant. Through such negotiation, a broken synchronization is supposed to be repaired.

However, if synchronization has been broken so deeply and could not be repaired through sacrifice, nature, following its rhythm, will move ahead, the climate will climb up the hills, and so will animals. Humans will then be left behind. Sama villagers felt that they have suffered a lot from being left behind. They claimed that the climate of the valley moved up to the mountainside, and that of their home village moved up to the mountain top. For instance, there were so many leeches in the mountainsides before, and even so in villages as buffalos and oxes wandering in the mountains carried them back. But a couple of years ago when people started to use herbicide in their fields, leeches started to disappear. Villagers said that leeches had moved either up to the mountain top or down to the valley. "Who knows. I miss them. It makes me feel weird without leeches stinging me when working in the field during the rainy season." A villager said so during an interview, seemingly to be humorous, while I could sense his sad mood.

Worse, herbicides do not kill weeds; a specific herbicide may clear weeds and make the earth dark, but after a while, weeds will come back and the same herbicide does not work any more. Another herbicide might clear weeds again, but the earth becomes darker." "I know there is something seriously wrong, but I don't know what is wrong. One thing I am certain about is that we have been left behind by the mother land. She produces only weeds and those plants that do not bear fruits." [08/22/2014] A villager told me. As an evidence, he pointed out that the production of amomum tsao-ko decreased tremendously in the past five year. In 2010, one family in the Sama who planted a lot of amomum tsao-ko earned about RMB 20,000 (USD 3,333), while in 2014, the income plummeted to less than RMB 5,000 (USD 833).

In a melancholic tone, villagers told me a widely circulated story full of moral lessons. In the past, suffering and surviving from malaria in Burma was an emblem of the Kachin masculinity. A border village locating at a mountain road to Burma was named after malaria: almost everyone passing the village would suffer from malaria on their way back from Burma.

As one villager narrated, “Every time I passed the village of malaria, my shoulders suddenly started to quiver, out of control. It was like that you were suddenly thrown into a cold and foggy forest in a dark night. Then I knew malaria had jumped on me, and I was sick arriving at my village.” But all these changed since the early 2000s. A business road from China to Burma was built in the early 1990s, enabling people to transform Burma into a place where they can fell down trees, plant bananas, teaks, and other commercial woods. “[There have been] too many trucks, too many people, and less and less animals and trees. Our mother land then moves away, so do animals, even malaria!” My informant seemed to be possessed by his nostalgia, even hoping malaria to come back. “When I was caught by malaria, my wife was kind to me. I did not need to work. I wandered around the village chasing the sunshine. I found that I begin to miss the sense of being hot and cold.” [08/7/2014] He and his wife divorced in 2011.

Conclusion: A Kachin Cultural Model of Nature.

The English word “nature” does not have an exact Kachin translation, though my informants definitely have a clear idea of nature. For them, nature does not refer to a thing, but rather to a process or a state. During interviews, most villagers said that they must have a Kachin word for “nature” (as a noun), but nobody could remember that word, including those who often write in Kachin. Instead, villagers talked about the word “nature” as a verb or an adverb. They pay more attention to the process of creating things or of how things change, rather than the things themselves. In daily conversations, they say something exists naturally (*sha³¹hka⁵⁵ bing³¹ ai³³*), meaning its existence is predetermined beyond human control.

Two words are used to refer to things naturally formed: *ma³¹tut³¹* refers to plants produced by the mother land (*nam³³ ma³¹tut³¹* refers to wild plants while *ma³¹tut³¹* also to the cultivated), and *nhprang³¹* refers to wild animals and minerals that are not directly produced by the mother land. A couple of villagers also use these two words as a translation of the Chinese word “nature” (*ziran*, meaning ‘naturally’ on its own as an adverb, or ‘nature’ as a noun; most villagers speak Chinese) or the English word “nature” (a couple of villagers from Burma know some English). In particular, weather is called *la³¹mu³¹ ma³¹rang³³* (*la³¹mu³¹* means “the sky”, and *ma³¹rang³³* means “rain”), and both weather and climate are called *ga³¹tsi³³ ga³¹htet⁵⁵* (literally, “cold and hot”). Weather follows its natural rhythm (*a³¹hka³³ la³¹do³¹: a³¹hka³³* means “things related to season and weather”, *la³¹do³¹* means “stages”).

These linguistic expressions illustrate the Kachin idea of nature, which I phrase in terms of their temporal scheme in this paper. All things in the world flow according to the temporal rhythms of the world (seasonal rhythm and those specified in the divination table). Humans follow these rhythms, regulating their desires and expectations accordingly. When desires expand out of control, people need to repair the synchronization between humans and nature through animal sacrifice. If the synchronization could not be resumed, things will flow away, and humans will be left behind. I consider such a flow between the predictable/rhythmic nature and the uncertain human desires as a Kachin cultural model of nature.¹⁹

¹⁹ Kachin in my fieldwork sites are currently influenced by three knowledge systems: the Kachin animal sacrifice, the Chinese folk beliefs, and Christianity. Traditionally, the Kachin played an intermediary role in the caravan-trade between the Chinese and Southeast Asia, and so the Kachin in China were politically and economically controlled by the Chinese (Maran 1967; Nugent 1982). The influence from the Chinese lies in two aspects: the naked power from the Chinese government and the fusing of southwest Chinese folk beliefs with the Kachin animal sacrifice. Kachin animal sacrifice makers treat Chinese folk belief as a resource for daily life regarding relations between

The key of this model is the idea of flow, and villagers told me a couple of social phenomena that illustrate their idea of flow. Climate climbs up the hills, animals move away, and cash crops move along. Kachin girls prefer to marry Chinese in the city, and boys have to take wives from Burma. Wealthy Chinese come into the mountain areas building their nice houses and enjoying nature, while the poor Kachin migrated into cities doing hard manual jobs. “Humans and things always move. Before, we Kachin followed the mother land wandering in the mountains. Now, we chase money and go to the city.” a villager so concluded. [8/13/2014]

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humans and spirits. From Chinese, Kachin learned to associate catastrophic environment changes with social-historical changes. Chinese have a long tradition in which environmental and weather changes (such as floods and earthquakes) foretell great socio-historical changes. In particular, in Chinese traditional medicine, weather changes are treated as the final reason of epidemic and collective health deterioration because they break the unity between humans and their surroundings. For instance, in the eyes of ordinary Chinese, recent natural disasters, like the Wenchuan earthquake in 2008 in southwest China, the Yushu Earthquake in Northwest China in 2009, and severe snow storms in early 2010, are all signs from the Universe that indicate possible future big socio-historical vicissitudes.

Christianity started to influence the Kachin from the late 1890s, and in my fieldwork sites, one-third of the population had been converted by 2010. Christians intend to convert each Kachin into a child of God, irrespective of cultural differences among His children all over the world. They provide an alternative knowledge system about nature and environment, adding moral implications to the catastrophic environmental changes. They attribute the current crisis of HIV/AIDS among Kachin to their betrayal of God’s teaching, and the drought in 2009-10 was interpreted as further evidence of the outcome of betrayal of God’s teaching.

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Fishermen's Concepts of Nature and Environmental Change in Batangas, Philippines

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This preliminary report is based on six weeks of field research at two separate field sites in Batangas, Philippines from March to April, 2014. The data was rich and is still being analyzed. This serves as a report of my preliminary findings. The primary goal was to discover the cultural model(s) of nature held by full-time and subsistence fishermen in this very important marine ecological zone, the Verde Island Passage. Questions driving the research included (a) how do fishermen understand human relationships to various elements in the natural environment including weather, climate, animals and fish, (b) how and why is the climate and natural environment changing (if they are changing) and (c) how and why is food production (fishing) changing.

Two sites (fishing communities in Bauan and Lobo, Batangas) were deliberately chosen that offered different scenarios in terms of the influence of non-governmental and governmental conservation education efforts, the presence of tourism and marine protected areas, the methods of fishing subsistence, the proximity to industry, and the relative health of the environment and fishing habitat. I looked for differences in perceptions of climate and environmental change and local knowledge about nature and climate in general and as it relates to food production.

I conducted 18 semi-structured interviews, 36 free-listing tasks, and 36 space tasks. Gist statements and key word lists from the semi-structured interviews have been created and the free-listing tabulations have been completed. They are currently being analyzed. Metaphor analysis of the semi-structured interviews is in progress. Methods also involved participant-observation, fishing expeditions, and nature-walks with informant narration.

The Fieldsites.

Both communities are located along the Verde Island Passage, a part of the Philippines known as one of the most important marine ecological zones in the world. The entire Philippines is part of the Coral Triangle.

“The Coral Triangle is a marine area located in the western Pacific Ocean. It includes the waters of Indonesia, Malaysia, the Philippines, Papua New Guinea, Timor Leste and Solomon Islands. Named for its staggering number of corals (nearly 600 different species of reef-building corals alone), the region nurtures six of the world's seven marine turtle species and more than 2000 species of reef fish. The Coral Triangle also supports large populations of commercially important tuna, fueling a multi-billion dollar global tuna industry. Over 120 million people live in the Coral Triangle and rely on its coral reefs for food, income and protection from storms.”²⁰

There is widespread recognition of the Philippines as a global priority for marine conservation. There are more marine animals in a meter of ocean water in the Philippines than anywhere else

²⁰ World Wildlife Fund website. <http://www.worldwildlife.org/places/coral-triangle>

in the Coral Triangle. The Verde Island Passage, the location of the two fieldsites, is located between southern Luzon and Mindoro islands, has the greatest variety of shore-fish species in the Coral Triangle, indicating that a vast wealth of other species resides there as well, and for that reason has been dubbed “the center of the center of marine biodiversity” in the global context.²¹

Bauan, Batangas, the first field site, is a community of 81,000 (2010) located on the shore of Batangas Bay, around 10 kilometers from Batangas Port. I first conducted research at this site in 1991. It is the most industrialized municipality in the province of Batangas. The priority of the municipality appears to be industrialization and capitalizing on strategic location with regards to Batangas Port—the second largest port in the country. However, the municipality is home to a number of Marine Protected Areas which are used by local beach and dive resorts for tourist snorkeling and scuba diving. The bay is a heavily-trafficked shipping route and numerous industries and communities line the coast. Much of the habitat has been heavily compromised.

The municipality has an old, well-established tradition of small-scale commercial fishing, and the field site is located in a shoreline area of the municipality (San Andres) notable for its high concentration of small-scale baby purse seiners with gill nets (*pukotan*). In addition, various other types of subsistence and smaller-scale fishing methods are employed with a variety of smaller vessels.

My interviews focused on captains, crew members, and vendors associated with the large fleet small-scale baby purse seiners. Changes in seasonal weather patterns including the increasing unpredictability of weather and storms effects them greatly. The boats, nets, and other equipment require a substantial capital investment to maintain due to the large size of the vessels and nets. A large crew of around 15 men must be maintained as well as smaller vessels that assist in fish capture. Costs to launch the boat, to beach it, or to engage in fishing expeditions are high, as are municipal permits and registration of fishing vessels. The vessels must be beached during stormy weather, and re-launched later, a costly proposition. Uncertainty caused by changing climate and weather patterns or decline in fish populations can spell permanent economic collapse for a boat owner and their crew members. Smaller-scale fishers (for example those involving smaller boats and crews of 1-5 men) have more flexibility in terms of altering their fishing patterns in response to unusual and unexpected weather variation; they also have lower economic stakes with lower capital investment.

Although *pukot* fishers have always dealt with a degree of unpredictability, their traditional coping strategies²² appear to be losing effectiveness given the increase in this uncertainty and unpredictability.

Lobo, Batangas, 37,000 population (2010) is around 60 km east of Bauan. As my second field site, it contrasts with Bauan in that it is a relatively pristine marine and shoreline environment. There are no large industries in the area, and it’s location outside Batangas Bay means it is relatively unaffected by major shipping traffic. The municipality has progressive agro-tourism vision that emphasizes ecological balance, sustainable growth (social, cultural, economic), and food. There are many beach and dive resorts. In 2005, the Lobo municipal government declared

²¹ Kent E Carpenter and Victor G Springer, 2005, “The center of the center of marine shore fish biodiversity: the Philippine Islands.” *Environmental Biology of Fishes* 72: 467-480.

²² In addition to expert knowledge of lunar cycles, seasonal winds, storm and weather patterns, and fish behavior, fishermen have used economic and organizational strategies, kinship networks, luck rituals, charms, and Roman Catholic rituals such as boat blessings.

one area of its shoreline a fish sanctuary and now the entire 3 kilometers of shoreline and 300 meters (980 ft) fronting the shore has been declared a protected area. Fishermen in the field site area are primarily part-time subsistence fishers (they also farm). They use a variety of fishing techniques but none as large as the *pukot* fishing found in Bauan. Artificial reefs have been installed in some areas, and exposure to governmental and non-governmental conservation training among locals is more common in Lobo compared to Bauan.

General Normative Understandings of Seasons and Moon Phases.

Seasons: In both communities, informants described two seasons (sometimes three), distinguished and named by either temperature, rainfall, wind/sea current strength, and wind direction:

hot and cold seasons
Temperature
hot [or dry] and rainy seasons
Rainfall
strong [or difficult] and calm seasons
Wind/sea current Strength
habagat and amihan seasons (may include salatan)
Wind Direction

Full-time fishermen often characterize the seasons according to wind direction and strength, while fishermen who also farm tend to use temperature and rain in distinguishing seasons. Many changes in annual seasonal patterns were noted by fishermen and other locals (see below).

The Moon and Fish Behavior: In both communities fishermen used the phases of the moon to time fishing trips. Some farmers noted a positive connection between rice seedling growth and a waxing moon phase, while crabs and sometimes fish were noted to grow more during a waxing moon. However, in Bauan especially, many fishers observed that the traditional system of using the moon for fishing is now “broken.” In other words, timing fishing with phases of the moon is no longer an effective technique for fish capture. This was attributed either to the lack of fish due to pollution in the bay, changes in weather patterns, or unknown/unknowable reasons.

Changes in the Environment, Climate, and Weather.

Locals in both communities noted many changes in the natural environment and the weather (often climate and weather were used interchangeably). Many of these changes had a direct impact on their livelihood as fishers and food producers. The changes are noted here using the wording close to what the informants used.

BAUAN

Beach is smaller by 50 meters

Seasons are more unpredictable (typhoons during dry season, delay of seasons)

Weather changes more abruptly (from hot to cold, rain to shine)

Weather is “stronger” (extreme heat, extreme rain, stronger storms)

More rain with storms, increased flooding
We are more “exposed” (mountains deforested, houses closer to sea)
No corals or plants in the sea
Fewer fish per catch and throughout year
Presence of fish in Batangas Bay unusually unpredictable with regard to
Seasonal species
Seasonal quantity
Presence during phases of moon
Length of time specific species stay in the bay
Quantity of fish available for capture year round
Annual variety of species typically caught (number down from 10 to 2-3)
Bay water is warmer

Note: Changes in seasons, especially the onset of rainy season, were so pronounced that a shift in the school year calendar was being contemplated by officials at the time of the fieldwork. In addition, there had been several years recently in which *pukot* fishermen caught no fish for the entire year.

LOBO

Storms come out of season (typhoons come during dry season)
Cold season extends longer
Hot season extends longer
The environment has become “stronger”
More extreme heat and cold, abrupt changes in temperature
The thunder and lightening are more frightening now
Hotter, dryer, more windy
Logging in mountains causes flooding, erosion

Note: A few Lobo informants reported no changes in the weather, environment, or climate. A few reported that their environment was being gradually restored (municipal laws regarding the use of land and marine resources were enforced).

Causes of Changes in Climate, Environment, and Weather: Some Preliminary Observations.

Climate and weather are beyond human agency in general: The tendency to view climate and weather as beyond human agency in general was noted in both field sites. Examples of gist statements to this effect:

There is nothing humans can do.
Humans cannot know why the climate changes, we can only observe the changes.
The climate effects us, we do not effect the climate.
The climate changes and we have to adjust.
We can adjust, but there will come a time when we can no longer adjust.

Some of these statements might reflect the concept of balance and equilibrium as a fundamental element of life that has been noted by some anthropologists of the Philippines. In this traditional conception or model, life processes involve a balance of positive and negative forces such as hot/cold, growth/decay, male/female, etc. This balancing process inherently involves temporary imbalance that brings about growth (similar to a metabolic process) necessary to keep things developing. Humans must remain neutral in this process. The role of humans is one of adjustment or adaptation in order to maintain balance. Adjustment is part of the dynamic of human-nature relations. Adjustment may involve change in values, attitudes, and relations. However it is possible to have unfavorable disequilibrium that can bring disaster or destruction so great that it cannot be repaired.

The general tendency to view climate and weather as beyond human control may stem from this underlying model of human-nature relations. In the statements above, humans adjust to climate (and weather) changes but do not change the climate. There is also a recognition here and in other statements (see below) that weather and climate changes may eventually reach a tipping point at which they are broken beyond repair and/or humans can no longer adjust.

Human activities in this area destroy the bay habitat: While informants generally do not conceive of weather and climate as within human agency, many reported that people create pollution that destroys the natural environment, specifically people in their immediate environment. This activity was often linked to the health of the bay habitat. A few also connected pollution to increased heat and lower fish stock in the bay. Many attributed the rise in sea level to activities of industries in Batangas Bay. None spoke of human activities generally or on a global scale as causing environmental destruction (although 2-3 people blamed Filipino national character).

Industries here dumped soil in the bay causing the water level here to rise (Bauan)

Corporations, ships, refineries pollute Batangas Bay (Bauan)

My neighbors dump garbage in the bay (Bauan)

Bay pollution makes the water hotter (Bauan)

Developments here leave no space for mangroves (Bauan)

Illegal fishing methods scare the fish away (Bauan)

Factories destroy corals (Bauan)

The destruction of the environment causes too much heat (Bauan)

The weather is hotter because there's too much development now (Bauan)

Fish cannot reproduce when the weather is too hot (Bauan)

Fish die/go away when it is too hot (Bauan)

Deforestation causes flooding (Lobo)

Filipinos are "hard-headed" by nature; they will never stop. Some people are just greedy.

Others are only supporting their families (Lobo)

You can't blame people, corporations, or the government: Although industry and development caused habitat destruction, health problems (air pollution), and a decline in the fishing industry in Batangas Bay, many Bauan fishermen stated that these activities were inevitable and beyond human control.

Corporations ruined the bay but we rely on them for jobs to support our families

Working for the companies cannot be avoided

*The government sells the land to corporations but the government must develop the country
People use illegal fishing methods but they are also trying to support their families*

Christian Understandings: Though not a predominant theme, some informants offered Christian-based understandings of weather and climate change. These explanations combined aspects of other explanations mentioned here, including human culpability (and agency by implication), lack of human agency, the weather/climate as human metaphor, the weather/climate as a cycle metaphor, and the unknowability of weather/climate:

Maybe the weather changes because God is punishing the people. God is mad at the people because they are getting wiser than God, they are bad, crazy.

People lack faith, prayer, going to church.

“Only God can know why the weather reverses.”

“The environment is having a tantrum. Even God is having a tantrum.”

“Personally I don’t know why the weather changes because neither we nor God make the weather, but the natural environment does it.”

‘They said that the weather (climate) from before will soon return. The past will return according to the Bible.’

Metaphors Used to Explain Climate and Weather Pattern Change.

The two major metaphors used to understand climate and weather changes in both communities are (1) the climate/weather as human and (2) climate/weather change as a cycle.

Personification of Weather/Climate (Weather/Climate as Human Metaphor) In this metaphor, the weather has moods, reactions, idiosyncrasies, and a life cycle similar to those of humans. The most widespread metaphor is that the weather, the earth, or the climate is getting old.

“The weather (climate) is like a human. It gets mad. It gets silent.”

“The people can’t be stopped, that’s why the environment is having a tantrum.”

“The weather gets wild even when it’s not the time for it to be wild.”

“The weather gets bored and we make our adjustments.”

“The weather here is kind to us.”

“The weather (climate, environment) changes because it is getting old. An old person changes his mind a lot.”

These metaphors also appeared when informants spoke of animals life. Certain sea animals have sentient lives, knowledge, feelings, fears, altruism, and guardian roles. These include especially whales, dolphins, sharks, whale sharks, turtles, and octopus. Fish have some of these capacities to a lesser degree. Young and old animals are qualitatively different and may react to things (pollution, heat, noise, illegal nets) differently. Larger species of fish are sometimes considered older.

Weather and climate change as cyclical The climate/weather change as a cycle metaphor has two subtypes.

(a) The climate and the earth have a human-like life cycle with an end. This metaphor is widespread in both communities. It is connected to the climate/weather as human metaphor, as in “the earth/weather/climate is getting old.” For example:

“It will end, but gradually, from hunger, from difficulties in work, in the system of work in the sea. Maybe that’s what they call the end of the earth. Maybe it’s almost like the earth getting old. It’s normal that it gets old. It will die. It won’t become young again. It will get even older. Nothing will be young again. Because the people here can’t be disciplined anymore. They’re hard-headed.” (Bauan fisherman)

(b) The annual weather and the earth’s climate change in a continuously turning cycle. This metaphor evokes small and large continuous cycles, and is also used to describe a fisherman’s economic life.

--Weather Cycles (small)

“Ever since I was a child the weather cycled between hot, cold, hot, cold and it always returned.”

--Climate and Earth Cycles (large)

“The earth turns. It’s just their time to get typhoons now.” [referring to people who live in areas not normally effected by typhoons, but who are now experiencing typhoons]

“The earth turns differently.”

[Question: Did the weather during your childhood get bored, too?] *“No, because that’s how the environment is, it doesn’t stay the same, it just comes and goes.”*

“They said that the weather [climate] from before will soon return. The past will return according to the Bible.”

Fishermen’s cycles (small)

“The life of a fisherman is like a wheel. Sometimes you’re up, sometimes you’re down.”

“Every day, sometimes we have some, sometimes we don’t. It goes around, returns.”

Possible Features of a Cultural Model of Nature.

Humans, animals, weather, climate and the earth may be linked by shared characteristics. The notion of a human steward role is found mostly among people who have been exposed to conservation education. It is stronger in Lobo where more people have attended conservation seminars. The changes in weather patterns and the local natural environment people are experiencing seem to be understood in various ways:

1. The earth, like a human, has a natural life cycle and is entering the end of it
2. The earth is returning to a previous phase in a continuous cycle
3. In both cases, humans can do nothing about changes in weather patterns and climate; they can only adjust to them
4. There will come a time when the environment is “broken” beyond repair and humans won’t be able to adjust

5. Human activities in the immediate vicinity are responsible for local environmental degradation, the depletion of fish supply, and the rise in sea level. These changes are *mostly* seen as inevitable. For the most part, people cannot hold other people accountable because people, corporations, and governments are just performing their roles.
6. Filipino national character (hard-headedness) is partially to blame for local environmental degradation but it cannot be changed.

Continuing Analysis and Next Phase.

Metaphor analysis and key word analysis will continue in the next few months with the goal of refining the proposed cultural model of nature held by Batangas fishermen in the Verde Island Passage. Going forward to the next phase, some questions have arisen in the first phase that will be explored in the second phase. This will be in addition to consensus analysis on the proposed cultural model, and refinement through pile sorts and other methods of my understanding of causality as it relates to the relationships between people, the supernatural, animals, plants, the environment, and climate/weather. Questions have arisen during the analysis that include, but are not limited to:

- (a) To what extent are different cultural models of nature evoked when talking about the local setting: conditions, weather, people, and fishing vs. global phenomena such as climate change and human roles and activities *in general*?
- (b) Have notions of fishermen's luck in explaining fishing success, which were very strong according to my 1991 fieldwork in Bauan, become somehow invalid now that fishing failure is widespread, and have magical and ritual elements that once were thought to influence success lost their efficacy in the face of degradation of the Batangas Bay fishing habitat? If so, how is that explained? In other words, what is revealed about the relationship between supernatural elements (that were once used to cope with uncertainty) and the environmental degradation that is now understood to negatively impact fishing success?
- (c) In the first (current) phase of research, the free listing task revealed that categories of natural and supernatural elements held by fishermen differ substantially from those held by farmers, especially in the relative elaboration of animals and supernatural/supra-natural forces (that is, there are further splits in these categories that were not predicted in the original lists that were elicited). This required on-the-spot modifications of the free-listing task, and as a result, the lists and the way they were elicited evolved over the course of the data collection period. I suspect that re-doing the free listing task with the new knowledge gained through this trial and error the first time around, will reveal more about the specific ways fishermen organize knowledge about nature and the relationships between humans and various aspects of nature. The marine-life categories are more varied and semiotically-rich than first anticipated, for example. Redoing the free-listing and then moving forward to the sorting task using these revised lists will be a productive way to both confirm or refine the proposed cultural models of nature.

Categories and Cultural Models of Nature in Northern Punjab, Pakistan

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The sub-district of Fateh Jang, in Attock District, is a semi-arid agricultural area with an overwhelming proportion of the population classified as rural (around 78% according to the Pakistan Bureau of Statistics²³). There are very few sources of surface water that can be relied on year round, and in the areas that form the specific focus of this working paper there are none. Historically, this has greatly restricted agriculture to those crops which can withstand extended periods without water, namely maize and wheat. Farmers have practiced mixed agriculture with buffaloes, cows, goats and sheep. Farm sizes in the area are not extraordinarily large by Pakistani standards, but the local landowning families have managed to maintain a remarkably coherent control over the peasant families using a variety of political strategies. Most farmers, therefore, do not own much, or even any, of the land that they cultivate.

In the past, the labor was arranged along South Asian sharecropping patterns, where the landowner served as a form of insurance for lean years and collected 50% of the yield at all other times (Lyon, 2004). In addition to collecting a half share of the crop yields, landowners could expect a certain number of days of labour from their sharecroppers and their families who would provide the labour for the lands that the landowners chose to retain under their direct control. Such relationships of service and obligation tied peasant and landowning families not only to one another, but also to service families in the village, such as barbers, story tellers, leather workers, metal smiths and so on. In the late 1990s, this residual *jajman*, or *seyp*, relationship was still reasonably widespread and there were few economic opportunities for poor people to secure alternative forms of reliable wage labour, though young men frequently left the region to work for wages for temporary periods. The most reliable mechanism for escaping the relationships of servitude and poverty available to peasant families was military service. From the 1970s, economic opportunities in Arab countries like Dubai, Qatar or Saudi Arabia became an increasingly viable means of escape as well.

Since the 1990s, one of the most visible changes to labor relations that have occurred in this area is the collapse of the traditional service relationships and sharecropping patterns. There are still some old peasant farmers in some form of sharecropping arrangement, but the landowners are increasingly required to pay day wages to the people who their land. They have also increased the use of rent both as renters and rentees. They have become less important as a form of insurance for hard years, though that role is not entirely absent. Dominant ideas about 'good' neighbourly relations impose expectations of charity on households and result in families feeling obliged to help in times of difficulty. This is done with some resentment since landowners must now 'bail out' poor farmers in times of hardship, but not reap the rewards of large shares of crops they had no part in producing. They do retain considerable prestige in the area, though the more overt forms of deference visible in the late 1990s are largely absent.

²³ Attock District at a Glance. 2015. Islamabad, Pakistan. [http://www.pbs.gov.pk/sites/default/files//tables/District at a glance Attock.pdf](http://www.pbs.gov.pk/sites/default/files//tables/District%20at%20a%20glance%20Attock.pdf).

Surface Water and Rain.

It is something of a truism to say that reliable sources of water are critical for the development of many types of agriculture, but nowhere does this become more clear and pressing than when there is a complete absence of any year round surface water. Large parts of Pakistan lack rivers or streams which provide reliable water throughout the year. Some places which historically had such surface water have now found these less reliable because of the development of major hydro damming projects which have changed the flows downstream. In the Fateh Jang sub district in Attock, there has never been reliable surface water. They relied on rains for agriculture as well as drinking water for themselves and their animals. In the past, people say that the rains used to come more predictably and in greater quantities, but they have always been susceptible to short term droughts and unpredictability.

Local Rhetoric of Nature.

Identifying a simple noun which encapsulates local cultural models of nature is potentially problematic in any society. Clearly, the term nature, in English, has a variety of meanings which shift depending on the context and have demonstrably shifted over time. In rural Punjab, the Urdu word for nature, *kudrut*, is understood but does not mean much. In other words, people seem to understand the word, but give it little to no thought on its own. This is, nevertheless, the term for nature that is most widely understood and recognized locally. It is very much something that acts upon people. Locally, people render this noun into what would ordinarily be the adjectival form with an ending ‘*i*’, but this does not mean that the word has been rendered into an adjective. One of the remarkable characteristics of the way people speak in Punjab, and particularly in the rural areas, is the playfulness with which they twist and modify words. The use of nonsense rhyming words is widespread and people happily modify standard words to suit their sense of aesthetics at the moment. Lyon once had a Bollywood²⁴ film called *Zakhm* (wound), on DVD. He told people the name of this film and they systematically referred to it as *Zakhmi*. When he showed the literate men the title on the DVD to prove that in Urdu there was no ending ‘*i*’ on the word, they shrugged and said that was probably correct, but *zakhmi* sounded better.

Kudruti includes trees, land, animals, rain and so on, but it is not a passive thing around someone. It is an active thing that impacts on people and has a personality. People have *kudruti* as well. So when we ask for *kudruti*, we must narrow it down a bit to the *kudruti* of the ‘atmosphere’ (*mahole ka kudruti* or *kudruti mahole*) or a specific person’s *kudruti* or a category of person’s *kudruti*. This may suggest a more holistic concept of nature which integrates all of the animals, plants, weather and people into a single system which is impacted by larger supernatural force—which in this case is clearly God, or Allah.

Methods.

We carried out a number of tasks to elicit a range of information about nature. This included:

²⁴ Bollywood is the nickname given to the Mumbai film industry.

- Semi-structured interviews about the environment change over time;
- Free listing task on several categories of ‘natural’ things:
 - soil (n=35)
 - animals (n=15)
 - trees (n=7)
 - plants (n=8)
 - weather (n=11);
 - The animals-in-a-row task (n=10).

The gender ratio of our participants was heavily skewed towards men in all tasks. We were not granted direct access to any women for these tasks. Although Lyon has worked in the same village for more than 17 years, and is therefore given considerable freedom to enter the private areas of the households, normally reserved for related men (*meharam*), it would be inappropriate for him to seek an extended interview with all but a select number of women. Indeed, even when he has had the opportunity to carry out extended interviews with very old village women, he has subsequently been asked to refrain from publishing anything from these interviews. It can be difficult for foreigners, especially European and North Americans, to appreciate the delicacies of gender expectations in rural Punjab. Families and households are judged on the behavior of the individual members, and particularly on the reputations that develop around them. One of the many constraints on the breadth and quality of these data is, therefore, the absence of women. This is not surprising and Lyon has previously reported on the notable segregation of genders in this village (Lyon, 2005; Lyon, 2004). Despite Lyon's unsatisfying previous attempts at addressing this absence by employing a female social scientist, we hope to address this issue in future research.

Semi-Structured Interviews.

These data remain only preliminarily coded and analysed, however, a number of striking points are worth mentioning here. Firstly, there is a clear consensus among farmers of all ages, that the climate has changed. Weather patterns are more erratic and rain, in particular, is less predictable. The village has endured periods of sustained drought as well as inundations of rain, both of which can result in catastrophic crop failure for small farmers. The largest landowners are able to survive in part through substantial investment in tubewell irrigation and by selling parcels of land in poor years. Land in the area around the village has risen in market value substantially in the past decade. With the introduction of a modern motorway in the early part of this century, residential ‘societies’ have begun to spread from nearby urban centres, including the capital, Islamabad, which is roughly 50 kilometres away. Travelling to Islamabad in the late 1990s took roughly 1.5-2 hours. On the motorway today, the same trip takes about 45 minutes. Since much of the land in the area is considered *banjr*, or uncultivable, landowners have reluctantly agreed to sell land they cannot afford to transform in order to either invest in other areas (such as orchards) or purchase modern technologies, cars, or build new homes and guest houses.

When queried about possible causes of climate change, illiterate and semi-literate farmers expressed a human cause, but not one that is entirely compatible with contemporary scientific models of climate change. The recurring theme revolved around Allah’s wrath triggered by immoral human behavior. This was expressed in various ways. One man pointed at his chest and

said Islamabadi women were showing too much of 'this' (cleavage). Another quietly suggested it was a consequence of rich Pakistanis drinking too much alcohol.

Lyon took a local farmer with him to Islamabad for company while he met with urban based business men on unrelated matters. The business men spent the evening drinking and watching modern Bollywood music videos with very scantily clad women dancing extremely suggestively. There was one video in which a women poured champagne from the bottle over herself in a scene that can only be described as proxy-porn. In the morning, after some of the business men had gone home and others were still sleeping off their hangovers, Lyon discussed the previous evening with the local farmer. The farmer was shocked at the previous night's display and said that this was why Allah was angry and it was why the Taliban could never be defeated. Good Muslims, he said, were appalled by this scandalous Indian culture/behavior, and so it was understandable that some would turn to groups like the Taliban to try and maintain the moral standards that Allah wanted for humanity. He is not a man who condones or supports violent political action, however, he was deeply disturbed by both the videos and the behaviors of the wealthy Pakistani business men.

The single greatest change in the region in the past three decades has been the increase in irrigation. The first tubewell was sunk in the village owned lands in 1981. That was on the site of the first citrus orchard which was developed roughly a decade later. There has been little, if any, coordination in irrigation practices among those landowners with the resources to develop tubewell irrigation. Consequently, the water is poorly distributed and the burden of investment is difficult to organise in ways that might generate economies of scale. The persistent land disputes have hampered village wide irrigation cooperation and these show no sign of diminishing, as the total amount of land available for agriculture is reduced and landowners sell off parcels of land to housing developers.

The drive towards greater and more reliable irrigation has led to the adoption of non-native crops to the region. This has had some negative consequences on farm employment. Landowners report a lack of confidence in local Punjabi farmers' ability to carry out non-*desi* (indigenous/local) farming practices. Some landowners have consequently employed migrant Pukhtun/Pathan laborers. Pukhtuns have a long tradition of migration and therefore are presumed to be more versatile in their ability to learn new farming techniques. Partly to address the perception that local farmers adapt poorly to new crops, government extension workers from the National Agriculture Research Centre have provided training for local farmers when landowners have agreed to participate in experimental trials of new crops (notably growing True Potato Seed and Canola).

There continue to be a large number of local Punjabis employed in farming despite a desire to employ Pukhtuns. In addition, the rise in political instability has also led to a growing reluctance to have too many Pukhtuns living around the village. For the most part, Pukhtuns are not invited to live in the village itself but are provided housing that is several kilometres outside the village where they can watch over and protect the fields for which they are responsible. Pukhtuns who are in the area for purely seasonal labor seem to stay with the Pukhtuns living outside the village. There are a surprising number of them around and in addition to working as farm laborers, they are occasionally called on to act as hired guards to intimidate rivals. While relations between Punjabis and Pukhtuns is courteous and cooperative when dealing with farm matters, this has caused considerable discontent among local farmers. Punjabis worry about what they say is an increase in kidnappings for ransom and in particular, worried for Lyon's safety. While in the late 1990s, Lyon was afforded more or less total freedom to interact with any man

in the region, since 2007, local people have expressed a great deal of unhappiness about him interacting with Pukhtuns outside of their presence.

While we have no verifiable data on the number of kidnappings for ransom in the area, these are reported to have increased dramatically. Lyon has met with family members and victims of those involved. The sums of money demanded are well researched and correspond with the amounts that a family can generate within about two weeks. The victims report being reasonably well treated in standards which are clearly tied to their socioeconomic status (i.e. wealthy kidnapping victims say they are locked into comfortable bedrooms with televisions and newspapers; poor victims may be kept in disused animal stables). Despite the reports of reasonable treatment, all victims are aware that the consequence of not paying is serious and typically means death.

The frequency of reported problems, political, climatic, economic and others, reflects a growing sense of frustration and dissatisfaction among farmers. Throughout all conversations, most farmers repeatedly muttered praise or gratitude for Allah when discussing difficult times (*Mashallah, Allah ka shukr, Allah hum de leyla* etc.). In one interview about the nature of Allah's creation, one literate farmer explained the relationship between different types of creatures. *Insahniyat* (humanity) was Allah's greatest creation and all other creations were there to serve *insahn* (man/human). This concept was echoed in other interviews, though not articulated as elaborately or coherently. We will explore this model of nature further in the future when all interviews have been comprehensively transcribed, translated and coded.

Free Listing Results.

The free listing exercise proved very useful, despite the challenges of carrying out such an exercise among a largely illiterate or semi-literate population. We could not give participants a sheet of paper and pen and ask them to list all terms associated with an idea. Instead, we asked them to verbally tell us types of land, or types of trees. They were clearly able to provide lists, but typically wanted to provide a context for each term. So when we asked about land types, the participants often provided us with examples of where we might find the specific land or soil type. They used terms like, *lepara*, and told us which specific fields that we had seen were examples of that soil type. While somewhat frustrating at first, this proved an invaluable source of information that was far richer than the simple lists of terms we sought.

We carried out free lists on land types with 35 men. All of the men were born in the region and have lived most of their lives in and around the village, though many have spent various periods of time as wage laborers outside of the village. Determining ages is imprecise at best, but we estimate that the ages ranged from late teens to mid 80s. Participants included men who own land as well as those who work exclusively on the land of others. There were two landlords (*zamindar*) included in the sample as well since they are not absentee landlords and work regularly with the peasant farmers. So while they do not tend to carry out actual manual labor, they are intimately involved in all the tasks performed and spend much of their time advising and overseeing their farm laborers.

Soil and Land Types.

Since the late 1990s, Lyon has been collecting data from experts on soil types. These experts include farmers who are said to be knowledgeable, soil scientists from the Pakistan Agricultural

Research Centre and the published literature on rain fed agriculture in Punjab. The lists have varied a bit, but have included the following terms:

- *Retlee*– sandy land
- *Patrelee*– stony land
- *Hulky zehree*– white land (also called *kamzour*)
- *Ruhkr*– uncultivated, unbalanced land
- *Ruhtee*– red land
- *Sufaid*– white land
- *Surukh*– red land in Urdu

This is not, however, a comprehensive list, because a specialized vocabulary for cultivated land also is used that includes words like:

- *Mera* – powerful land (people describe this as *achi* (Urdu) or *changi* (Punjabi), both terms for good.
- *Luss* – near the village where the land gets animal fertilizers
- *Lepara cheri* – this is said to be the best land
- *Hulky mera* - weak land
- *Banjr* – forest, uncultivated

In practice, soil experts working in rain fed areas of northern Punjab, have reduced these land types down to two salient categories: *lepara* and *mera* (Byerlee, Sheikh, and Azeem, 1992). This reflects, in part, the focus of experts on soil that is most likely to produce high agricultural yields.

In Table 1, all terms listed by two or more farmers have been included. It would appear that agricultural experts and local farmers are employing different categorical criteria for classifying land. Although they are both driven by concerns with fertility, local farmers employ color terms to distinguish highly fertile soil (*kaali*=black) from less fertile soil (*chitti*=white and *retlee*=red). Farmers know a great many terms for soil and employ numerous synonyms, including some very playful ones that combine nonsense rhyming words on the end of the soil type (for example *chitti-shitti*). The use of nonsensical rhyming words beginning with *sh* is very common in this part of Punjab and the principle is found across a number of South Asian languages²⁵.

Table 1: Soil Types (All Terms Listed 2 or More Times)

Item	Frequency (%)	Average Rank	Saliency
chitti (white)	80.0	3.25	0.439
kaali (black)	77.1	2.78	0.515
retlee (red)	60.0	3.57	0.357
banjr (uncultivated)	17.1	6.50	0.069
patrelee (stony)	14.3	3.00	0.104

²⁵ See Abbi (1985) on the distribution of reduplicative structures (RS) present across all South Asian language groups. Abbi argues that modernization is ‘killing’ RS in more ‘developed’ languages like Punjabi, so this pattern of nonsensical rhyming may be a residual consequence of an earlier semantically meaningful RS.

Item	Frequency (%)	Average Rank	Salience
sakhat (hard)	11.4	1.75	0.097
kallar	8.6	3.67	0.055
naram	8.6	2.33	0.059
khushak	8.6	1.33	0.071
surukh	8.6	6.33	0.034
sem	8.6	6.00	0.022
ruhkr	8.6	5.33	0.046
seekra	8.6	6.33	0.015
tibbay	8.6	4.67	0.029
zarkhez	8.6	2.00	0.066
baraani	8.6	2.33	0.063
mera	5.7	8.00	0.024
matt	5.7	1.50	0.054
luss	5.7	9.00	0.019
pathar	5.7	5.50	0.021
ghulabee	5.7	4.00	0.026
changi	5.7	2.00	0.046
hulky-zehree	5.7	3.00	0.048
kassi	5.7	6.00	0.021
kanjur	5.7	5.00	0.025
lepara-cheri	5.7	10.00	0.014
hulky-mera	5.7	11.00	0.010

After the three most common color terms for soil (*kaali*, *chitti* and *retlee*), the terms drop considerably in frequency and saliency. The remaining terms describe a range of physical properties of the soil, such as rocky (*petrelee*) or hard (*sakhat*). Many of the soil types provided do not exist in the local region, but farmers are aware of neighbouring areas where these can be found.

Animals.

We asked 15 male farmers to list animals that were present in the local area. Some men included camel (*oont*), which do not live anywhere in the village or in immediately neighbouring villages, but pass through the area periodically and exist in villages within 20 minutes' drive. One person

listed camel as camel-horse (*oont-gora*), suggesting that while known, camels are not particularly important categorically in the local contexts.

The top three animals listed are, unsurprisingly, the most ubiquitous animals present in the area: buffaloes, cows and goats. Each was present in 93.3% of the lists and came early in most peoples lists. Very few of the animals listed were not domesticated farm animals, though some pests were included (for example *kundey-wala* a type of insect and *seyr*, wild boar). There were birds included, though in no case did any farmer begin his list with a type of bird. Animals of prey (quail, partridge, rabbit) and burden (donkey, horse, bull/ox) were included. Sheep and cows were listed by sex (*doomba*=ram, *bheyr*=ewe, *gai*=cow, *dand*=bull or ox). Animals that do not have different root terms for sex difference were not listed separately (e.g. horse=*gora*, mare=*gori*). There were no terms for animals which had been castrated, which is not surprising since this is not a common practice in the village. They do not keep male animals in large numbers and those that are present (like rams) are used for reproduction before being slaughtered for meat.

Table 2: Animals (All Terms Listed 2 or More Times)

Item	Frequency (%)	Average Rank	Salience
beins (buffalo)	93.3	2.00	0.874
bakri (goat)	93.3	3.29	0.778
gai (cow)	93.3	3.07	0.782
kutta (dog)	73.3	7.73	0.357
gudda (donkey)	66.7	6.10	0.391
billi (cat)	60.0	7.89	0.263
chiri (sparrow)	60.0	11.56	0.204
kava (crow)	53.3	11.00	0.177
doomba (ram)	53.3	5.75	0.381
bheyr (ewe)	53.3	4.50	0.386
gora (horse)	40.0	6.00	0.244
seyr (boar)	40.0	9.33	0.184
teetr (partridge)	40.0	15.00	0.063
battaira (quail)	40.0	14.50	0.072
saor	33.3	9.60	0.144
kongi	33.3	11.00	0.107
lumbr	33.3	11.00	0.105
loali	33.3	9.80	0.133
pagyar	26.7	8.50	0.138
dand	26.7	7.25	0.162
bad	26.7	9.50	0.121

sanp	26.7	12.00	0.065
chani	26.7	13.00	0.046
lama	20.0	14.33	0.055
oont	20.0	7.00	0.119
gargo	20.0	13.67	0.028
chitti_kiri	20.0	17.00	0.023
kunde_wale	20.0	8.33	0.103
khargosht	20.0	8.00	0.109
prindi	13.3	10.50	0.064
seya	13.3	12.00	0.036
bada	13.3	3.00	0.117
gidr	13.3	7.00	0.080
babl	13.3	2.00	0.117

Trees.

We free listed trees with fewer farmers because most farmers claimed to draw a blank on trees. While we could successfully encourage them to name trees by prompting them with some suggestions, we discarded all free lists that included terms that we had suggested. Consequently these terms were generated from only 7 farmers. Despite this low number, there were 59 tree terms listed, so those farmers who did know trees, tended to know rather a lot of them. There were far fewer terms listed two or more times, however, suggesting that there is not as much shared knowledge of trees as either animals or soil types.

Perhaps the most interesting thing about this list is the frequency of *malta*. This is an imported variety of citrus tree which has become extremely important in wealthier farmers attempts to generate more income from cash crops. Only very wealthy farmers can afford to introduce any type of orchard because the initial investment is very high and the subsequent demands for irrigation are ongoing, both in terms of energy (either electricity or diesel to power the pumps at the tubewells), and maintenance. The first orchards in the area were citrus trees. These were introduced beginning in the early 1990s and there was one well established orchard when Lyon first arrived in the village in 1998. At that time, two other farmers were investing in citrus orchards outside of the village. In the past 10 years, wealthy farmers have invested heavily in more diverse varieties of orchard (primarily peaches and grapes). Although *malta* is the most frequently cited tree, it had a lower average rank than all but two of the eight most frequently cited terms. This may suggest that while it is a well known tree, it is not particularly important for peasant farmers.

Table 3: Trees (All Terms Listed 2 or More Times)

Item	Frequency (%)	Average Rank	Saliency
malta (Malta orange tree)	71.4	6.60	0.375
kikr	57.1	2.75	0.494

Item	Frequency (%)	Average Rank	Salience
kava	57.1	4.50	0.364
pilai	42.9	5.67	0.298
kander	28.6	14.00	0.040
kikri	28.6	3.50	0.222
aru	28.6	8.00	0.152
tali	28.6	6.00	0.163

Plants.

We initially attempted to collect plant lists by sub-category. This was reasonably successful with trees, but did not generate particularly good results when we distinguished between cultivated crops and wild plants. The distinction is clearly there, but in a free listing context, farmers seemed unable to remember plants by such categories. By the time we asked farmers to generate these lists, they had already done a number of free lists on other categories of nature, so it may have been task fatigue. To their credit, they tried to carry out every task to the best of their ability, but none of the men that we asked to do this task attended school. We suspect that asking illiterate farmers to do repeated tasks which feel like academic tests or exams, may be more distracting than anticipated. It is perhaps necessary to ask a single individual to do only one or two free listing tasks in one sitting.

In the end, we wound up with usable free lists on plants from 8 men. The most frequently cited terms (*maki*=maize and *jondra*=a fodder plant) did not have the highest average ranking. Wheat (*gundum*), although only mentioned by 4 out of the 8 men, had the highest average rank of all the terms. There were more than 60 terms listed in total and many of these were particular varieties of specific plants. In particular, several people each listed more than one type of lentil, though interestingly, only two varieties of lentil were mentioned by two or more farmers (*mangni* and *masoor*). Grains and fodder appear to be the most important plants listed, though potato also appeared in 50% of the lists (see Table 4 for the complete list of all terms mentioned by two or more farmers).

Unfortunately, the usable number of lists from this exercise is very low. This probably means that there are few, if any, inferences possible about priorities, distribution or organisation of plant knowledge among this population of Punjabi farmers. This may be something that can be dealt with more adequately at a future time.

Table 4: Plants (All Terms Listed 2 or More Times)

Item	Frequency (%)	Average Rank	Salience
maki (maize)	62.5	2.80	0.521
jondra (fodder plant)	62.5	4.20	0.422
gundum (wheat)	50.0	1.00	0.500
bajra (millet)	50.0	5.50	0.328
aloo (potato)	50.0	7.75	0.224

Item	Frequency (%)	Average Rank	Saliency
jawar (sorghum)	50.0	5.00	0.348
sarey	37.5	5.00	0.279
jaon	37.5	4.00	0.301
mangni (lentil)	37.5	10.00	0.129
matr (peas)	37.5	7.67	0.125
bangen (aubergine)	25.0	13.00	0.074
kanok	25.0	2.00	0.235
jamiyan	25.0	8.50	0.133
masoor (lentil)	25.0	12.00	0.082

Weather.

Perhaps the most surprising category of all was weather terms. After collecting 11 free lists on weather, we realized that respondents not only found this task confusing, but they genuinely seemed not to be able to list weather terms without prompts. There are, to be sure, considerably more terms for weather than those we collected, and both Lyon and Mughal have heard local farmers use these terms, but respondents appear to have found it difficult to recall the terms in the abstract. Since the total number of listed terms was 7 (once synonyms were collapsed), we have listed all terms even if mentioned by only a single respondent (see Table 5).

All respondents listed two categories of weather: *sardi* (cold) and *garmi* (hot). In some ways, this reflects the range of experienced weather in the region. Winters are very mild and temperatures rarely drop below 5°C. Summers are very hot and can reach the high 40s and even into the low 50s on occasion (°C). Rains are reportedly less predictable than in previous decades and do not occur in all months. The fifth term on the list, *bahar* (spring), is the name of the season in which the freelisting exercise was conducted. The term *acha* (good) is almost a synonym for *garmi* (hot). When asked what constituted *acha* weather, farmers replied *garmi*, however, this must be understood as a contextualised answer. We are not confident that they would reply that *acha mosam* (good weather) equals *garmi mosam* in June or July when the heat is at its peak.

Table 5: Weather (All Terms Listed)

Item	Frequency (%)	Average Rank	Saliency
garmi (hot)	100.0	1.36	0.883
sardi (cold)	100.0	1.91	0.706
barish (rain)	54.5	3.67	0.185
saf (clean)	18.2	3.50	0.076
bahar (spring)	18.2	5.00	0.052
acha (good)	18.2	3.00	0.083
sourij (sunny)	9.1	3.00	0.061

Animals in a Row Task.

Lyon carried out this task in a follow up visit to the village in 2015. He did it with 10 male farmers who grew up and lived in the region, though some of them had spent some time out of the village working in wage labor in nearby cities for limited periods of time. It was not possible to do this with any women. There appears to be a slight preference for using the relative Frame of Reference (FoR) (54%), though it may be that this would change when the test is conducted outside. In the three individuals who did this task outside, there was a clear preference for an absolute FoR (14/15 trials). The majority of participants were illiterate and had received no formal schooling at all (8/10). When the two literate participants were removed, there was only a slight decrease in the preference for relative FoR (52.5%) (see Table 6 for details of the results).

Table 6: Animals-in-a-Row Task (N=10 Individuals x 5 Trials)

	Relative	Absolute	Mixed-	Total				
Resp	FoR	FoR	Facings	Trials	Age	Sex	Literate	Educ
1	5	0	0	USD5	24	M	Yes	Class 8
2	5	0	0	5	34	M	No	0
3	4	1	0	USD5	25	M	No	0
4	2	3	0	USD5	49	M	No	0
5	4	1	0	USD5	40	M	No	0
6	4	1	0	USD5	50	M	No	0
7	2	3	0	USD5	35	M	No	0
8	1	4	0	USD5	57	M	Yes	Class 10
9	0	5	0	USD5	30	M	No	0
10	0	5	0	5	30	M	No	0
	USD28	USD23	USD0	USD50	35.6	10 men	2 yes	8 no schooling
	!B14 Is Not In Table	!C14 Is Not In Table	!D14 Is Not In Table			0 women	8 no	1 to 8 years
				Mean	34.5			1 to 10 years
				Median	35			

The starting direction of the animals and the order of the animals was changed for each trial. One participant objected to this and re-ordered the animals by size for each trial, though he seemed unconcerned with the direction each animal faced. The toy animals were a bull (*dand*), a

ewe (*bheyr*) and a horse (*gora*). Each of the animals was immediately identified as not being local breeds. The farmers were familiar with the ‘Australian’ bull, but found the English ewe decidedly ‘foreign’. The horse, although stockier and rounder than local horses, did not attract much comment from the participants. The animals were particularly lifelike and included obvious genitals so the farmers used specific sex terms to refer to each of the toy animals.

Conclusion.

The results presented here remain preliminary and subject to change following further analysis of the interview data and future data production. The richest source of data thus far has arguably been the interview data, in which it is possible to begin to develop a coherent cultural causal explanation of identified problems of climate change. Although the local causal model is at odds with global scientific explanations, it nevertheless places the blame squarely with human beings. Like the dominant scientific model in the West, it attempts to incorporate technical and moral explanations.

In the Western model, excessive carbon production and emission has led to changes in the composition of the Earth’s atmosphere which disrupt patterns of heat flow. Excessive carbon emissions are a consequence of lavish energy consumption which many of the world’s governments are attempting to frame as morally questionable. For local Punjab farmers in this part of northern Punjab, the mechanism for disrupting rains, in particular, is rooted in the omnipotent Allah who has the power, and authority, to deprive humans of rain or flood them with excessive rain at will. He does this because he is angry about the behavior of humans. The dominant reason given for Allah’s anger is immorality in the cities which is being adopted by rural people. Some farmers blame Indian and Western cultures for spreading immoral, un-Islamic ideas and behaviors to the rural areas and triggering Allah’s anger. The typical response to this anger is to say that people should pray more, both in the mosque as well as in local and regional shrines. The latter locations for praying are themselves cited as part of the cause of Allah’s anger by farmers more heavily influenced by Wahabi or Salafi influenced schools of Islam, including the Deoband school which is the majority among Pukhtun groups. This remains a minority in rural areas and is correlated with higher education levels. The less formal education a person has, the more likely he or she will be a follower of Barelvi Sunni Islam, a South Asian variety of Sufi Islam.

Free listing tasks produced mixed results. The free lists on soil types, animals and trees were reasonably extensive and informative. The one for plants is probably insufficient for inclusion in comparative analyses within this project. The free listing on weather, although clearly an inadequate reflection of the range of weather terms that Lyon and Mughal have heard in the village, is telling. The relatively short lists and the unanimous inclusion of the terms *garmi* and *sardi* (hot and cold), suggest that weather may be something that is not emphasised or prioritised by farmers because it may be perceived as too far beyond their control. The more elaborated vocabularies elicited on other topics all refer to domains in which individual farmers can make reasoned choices, but weather must be endured regardless of the impact on one’s crops or comfort. This, like other matters, requires further study to generate and test plausible hypotheses for the drivers of such apparently restricted vocabularies.

The animals in a row task does not provide a clear FoR preference, beyond the possibility that performing the exercise outdoors may yield greater evidence of absolute FoR. Aside from this finding, there is insufficient data to infer any impact of literacy, age or caste on preferred

FoR. The relative balance of absolute and relative FoR may suggest that members of this village, which 15 years ago was fairly detached from urban areas, have begun to adapt to greater mobility provided by an increase in the number of motor vehicles (motor cycles, cars, mini vans). In the late 1990s, there were villagers who rarely left the village, including some large landowners. At that time, a minority of the village children were pursuing education and the majority of those who did were only able to attend the state school in the village²⁶. Today, almost every peasant farmer works at least part of the time for a wage, and they use this wage to pay for their children's education. Large landowning families educate their children entirely outside of the village which means that motor vehicles are far more regularly travelling back and forth between the village and urban centres as far as one hour away. All of this may well have effected the dominant FoR of even illiterate peasant farmers as they begin to experience greater mobility in a recently expanded sense of what constitutes their *ilaqa* or region.

There is much analysis yet to be done before it is possible to determine what model of nature might defensibly be proposed as dominant, but at present, there is some evidence to suggest that the most widespread model of the natural world involves a powerful supernatural domain, which includes Allah, as a sole God, plus, various non-human spirits or *jinn*, who can be both benign and malicious, and a bewildering array of spiritually powerful saints, or *pir-fakir*, to whom individuals can pray and seek some form of intervention. These *pir-fakir* do not themselves perform miracles, typically, but they are beloved by Allah and are somehow in a position to sway His actions in some people's favor. For Barlevi Sunni Muslims, this influence continues even after death, which means that the gravesite of powerful *pir-fakir* themselves become sites of religious worship and devotion. While this is arguably contrary to a literal interpretation of doctrinaire Islam, it is nevertheless remarkably widespread across the Muslim world and constitutes majority practice in South Asia. The remainder of the 'natural' world, including non-human animals, plants, weather and so forth, appear to be part of the benevolent offering from God. So while there remain a number of questions to be answered in how inanimate and animate entities are related, there is no evidence to suggest widespread animist models of such things having independent relations to one another, as opposed to being the product of a single deity.

²⁶ See Lyon (2004b) for a brief description of some of the problems of schools in this area in the late 1990s. In particular, the village school was run by a brutal teacher who frequently failed to show up and seemed to spend an alarming amount of the school day taking extended tea breaks in the village tea shop.

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Lithuanian Farmers, Nature and the Ties that Bind

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Introduction: The Nature of our Research Task.

I was charged with the task of finding the cultural model(s) of nature held by Lithuanian farmers.¹ It is recognized that there must be some causal relationship between a cultural model one has in his or her head and the way one acts in contexts where this model is relevant and activated. Thoughts about a particular cultural domain must be organized into molecular, coherent, and shared models if behaviors are not to be both random and idiosyncratic. Cultural models are not just distilled representations of collective knowledge divorced from reality; rather, they are used to make decisions and act in the world in socially acceptable, normative ways. Secondly our research on cultural models of nature was thought to provide a means for assessing, indirectly, if and how farmers account for and deal with climate change. All farmers in Lithuania have heard about climate change as there are active educational/informational campaigns and policies implemented by the EU and Lithuanian government that address this issue. How then are cultural models of nature implemented if at all by farmers to deal with this issue? Thus the nature of this research task (pun intended) was three fold (the order of tasks below also correlates with the research priorities at this stage of our project):

1. To discover and provide a tentative description of Lithuanian farmers cultural model of nature;
2. To describe the causal relationships between this model and their decisions, thoughts and actions with regard to farming activities;
3. To describe and analyze how farmers understand and respond to climate change in terms of their cultural model(s) of nature.

The primary goal is the first task: to get at the farmers' cultural model(s) of nature. Without a grasp of the basic features and relations that constitute the cultural model the other two questions cannot be addressed. It is of course not certain that farmers have one, two or more cultural models of nature. If we take a cultural model to be a mode and lense for understanding, explaining, and shaping actions then we would take as axiomatic that significantly different cultural models are likely to produce different understanding, rationales for acting, and social practices (understood as patterns of actions). Hence, the most important task is to discover the cultural model of nature held by farmers.

Randall Collins (2004) is perhaps the most influential social scientist who argues for and analyzes human behavior as embedded in, adapted to and therefore shaped by micro-contexts. According to Collins human life is a chain of micro-contexts and we cannot step out of these. Given this, it is fair to say that cultural models emerge from and are meant to engage with the material and cultural conditions of micro-contexts. Thus cultural models should be robust in that they can be adapted to and used across many different situations. With this in mind, I conducted a multi-method approach to obtain sufficient data for constructing cultural models of nature. These models are usually informally learned through primary experiences in micro contexts and are then used to shape understandings and behavior in those contexts. The various concepts relevant to constructing Lithuanian farmers' cultural models of nature should be those that are

¹This is in reference to Dr. Giovanni Bennardo's overall leadership in instituting and writing the NSF proposal for this cross-cultural research project. I thank him for the opportunity to participate in this project.

directly related to normative farm practices, values, beliefs and decision making processes. In short, we seek not only to use experimental methods—what Widlock (2007) refers to as “uncommon tasks”—but also methods that are context sensitive and employed in everyday tasks—what Widlock refers to as “common tasks.”² The methods section below describes these methods and their goals. I first present an overview of the fieldwork site and the participants in the study.

1. Fieldwork Site and Participants³.

Fieldwork was conducted in Lithuania and was multi-sited (See Map). I had originally thought to conduct single-sited research in the rural area around Telsiai in NorthWest Lithuania. I had previously conducted fieldwork in that region (2002-4). However, for both pragmatic and methodological reasons I decided to extend the research to different areas of Lithuania. The main pragmatic reasons is that I had hired three Lithuanian graduate students in anthropology to help with collecting data in Lithuanian. We worked in a number of villages in different areas of Lithuania. Methodologically, I had wanted to extend the study to include a variety of different farmers from different areas so that we could be confident in our ability to generalize from our sample to the target population of “Lithuanian farmers.” Our samples are of sufficient lengths and variability (in terms of land size and cattle versus crop farming) that the samples for the freelists (N=32), semi-structured interviews (N=37), and animal task (N=43) are sufficient to meet the requirements for cultural domain sampling as described by Weller and Romney (1988), Handwerker and Wozniak (2002), and Bennardo and de Munck (2014).

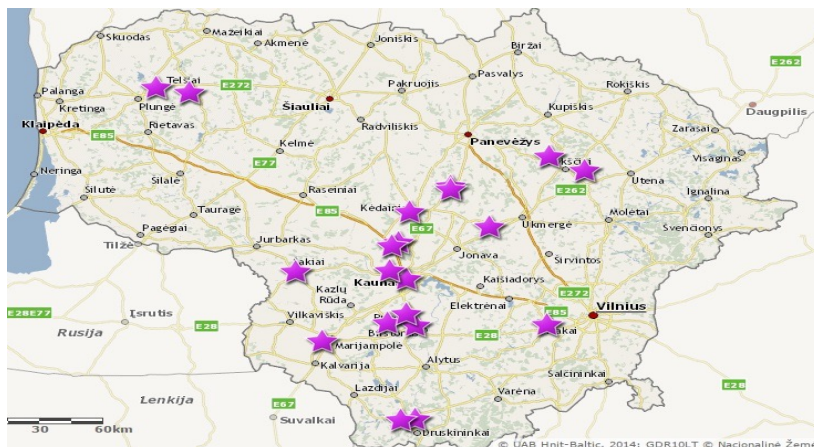


Figure 0: Map of Research Sites in Lithuania

² We discuss Widlock’s distinction more thoroughly in the section on the animals-in-a-row task.

³ Acknowledging that farmers are, in terms of general gender classification, males or females, I sometimes bifurcate gender as s/he or him/her but often opt for varying the gender alternatively calling the farmer “she” and then “he” and using “man,” “woman” or human. My goal in using these pronouns and nouns is to minimize sexist language, but also to create fluent sentences. It is also the case that most farms where we conducted interviews are run equally by males and females (husbands and wives).

2. Methods for Data Collection.

Three methods of data collection were used: freelists, semi-structured interviews, and the animals-in-a-row task. The overarching goal was to collect data which can be used to obtain one or more cultural models of nature held by Lithuanian farmers. The study was conducted under the axiomatic assumption that since farmers work in an environment that may more colloquially be referred to as “nature” (i.e. “*gamta*” in Lithuanian), the decisions they make regarding farmland and livestock will be influenced by their cultural model of nature. I have worked extensively in Lithuania since 2002, living there for approximately two years up to 2005, making annual trips to Lithuania, and currently living and working in Lithuania for a two-year period (August 2014–August 2016). My working knowledge of Lithuanian language while not fluent suffices for basic communication and reading comprehension. Three graduate students from the Anthropology Center at Vytautas Magnus University were hired to assist in collecting data, they were also trained to collect data on their own.⁴ This permitted the research to be conducted at different field sites so that local field site biases might be eliminated, and that the study was more generalizable than otherwise it would be. We have information from a range of farmers from different areas of Lithuania and with different sizes and types of farms ranging from 2–500 hectares of land. All discussions of farmer-research interactions will be confined to those engaged in by the author.⁵

All freelists, semi-structured interviews and the animal-in-a-row tasks took place in the residencies of the farmers and at a time convenient to them. All were told they could halt at any time and that they would not be identified nor would information that could be used to ascertain their identity be reported. All the farmers were sympathetic, willing to participate and understood that they could quit whenever they wanted without any ill will or problems. Each of the data collection methods is described below.

Freelists were typically conducted in the kitchen or living room and the freelist frame was either to “list all the _____” or “what are the _____?” with the content of the slot (i.e. ____) varying according to question. Informants were to write their responses on paper provided. For the freelist questions, respondents tended to provide phrases or short commentaries (usually less than one or two sentences long, and mostly three to four words). After all the freelists were collected the primary investigator with one or two assistants, would work to shorten the responses to keywords. These are presented in the freelists presented below. Thus the freelist words and phrases also serve as short-hand for the “keywords in context” (KWIC) that aided in the analysis of the freelists.

For the analysis below, we do not use freelists collected on animals, plants, supernatural beings, weather or the physical environment. The reason for this is that they do not contribute to our analysis of a cultural model of nature. The author decided to ask more direct questions about cultural models of nature via freelist questions. D’Andrade has argued (2005) that it is better to ask indirect questions than direct ones, but this was recommended when he was studying American cultural values and already had specific dimensions in mind. Our knowledge of Lithuanian conceptions of “nature” lacks this sort of initial sophistication. Furthermore in his earlier work on contagious diseases and kinship (which are concrete nouns—e.g. cough, flu; mother, son rather than conceptual nouns—e.g. aggressive, liberal) he used direct elicitation

⁴ I have been teaching on a part-time basis in the Anthropology Master’s Program since 2005.

⁵ “We” (when used) refers to the author and assistants and is also used in the royal sense to refer to decisions made by the author.

techniques (e.g. “List all the diseases/kinship terms you know”). While indirect measures may be better, if they don’t work well, one can use more direct methods. Given that this is exploratory research, in which we are gathering data from which to build a cultural model of nature (or more than one), any data that contributes to this process is useful. Hence, I decided to use a series of questions directly related to the concept of nature (i.e. *gamta*) and that had been intended for semi-structured interviews.⁶

Gamta is frequently mentioned by Lithuanians as important to their sense of national identity. In an earlier, unrelated study, *gamta* was the most frequently mentioned term in a freelist asking Lithuanians, “what characteristics of Lithuania are you most proud of” (“*Kuo Jūs kaip lietuvis/lietuvė didžiuojatės?*”). One hundred and twelve informants were used for this study and informants were equally distributed between males and females and rural and urban residents. The definition of *gamta* is, relatively speaking, quite clear and seems semantically equivalent to the denotative meaning of the English word “nature.” In discussing early twentieth century poets, Šilbajoris (1996) shows how Lithuanian poets conceptualize nature in opposition urban life and culture in a way similar to that found in the Euro-American conception of nature. However there is a difference it seems in the intensity and intimacy of the relation Lithuanians hold with nature. As Šilbajoris writes of these poets, “Their trademarks were village life as opposed to the city, romantic patriotism set against the imperial Soviet mentality, and indeed...the image of a ritualized course of life, as if professing some sort of a Lithuanian religion, with nature as its temple (1996: 5). However, as it will be shown, it appears that the connotative understanding of *gamta* generates intimate-relational responses that suggest it is a core feature of Lithuanian national cultural identity.⁷ All Lithuanians recognize, whether they feel it or not, an emotional, intimate relationship or affinity with *gamta*, that is, I believe, absent in the normative conception of “nature” in the United States.⁸

The freelists used to analyze and induce a cultural model of Lithuanian farmers’ conceptions of nature are presented in the List 1 below; the English is followed by the Lithuanian translation.⁹

List 1: Freelist Questions Used

1. List all typical farm tasks that you do over the year?
Surasykite visus tipiškus darbus, kuriuos dirbate savo ūkyje metų bėgyje?
2. List everything that comes to your mind when you think about nature
Kokios mintys ateina į galvą kai pagalvojate apie gamtą?
3. In what ways do humans use nature? In what ways are humans a part of nature?
Kaip žmonės naudojasi gamta? Kuria prasme žmonės yra gamtos dalis?
4. List some of the bad things humans do to nature.
Kokius įvardintume blogus dalykus žmonių daromus gamtai?

⁶ In any case, informants mostly answered the freelist questions in sentences and short commentaries which we then culled into key words.

⁷ In fact, the idea of linking *gamta* with national cultural identity is propagated in the public educational system, as we will later discuss and there would be, I believe with almost one hundred percent certainty, consensus by Lithuanians on the statement that “nature is a core concept of Lithuanian identity.”

⁸ I must add that this observation is based on anecdotal evidence for the United States, though as a citizen and resident of the USA for the vast majority of my life, I have not experienced a corresponding stated affinity to nature among U.S. citizens as it is found among Lithuanians.

⁹ Other freelist questions were asked but are not relevant to this report. The English translations were worked out by the author and native Lithuanian speakers.

5. List all the problems you have as a farmer

Su kokiomis problemomis susiduriate ūkininkaudamas.

6. What are the effects of climate change on your farm work and productivity?

Kaip klimato kaita įtakoja jūsų ūkininkavimą ir produkciją/produktyvumą?

We conducted long semi-structured interviews with thirty-seven informants. These were conducted independent of and after the freelists were completed. The semi-structured long interviews were conducted, for the most part, with a different sample of farmers than were the freelists. Like the freelists, interviews were conducted in the compound, and usually in the kitchen area of the farmer's residence. Often the interview was conducted with both spouses present but the male usually did most of the talking. All interviews were between one and two hours long and conducted in Lithuanian. The informants were uniformly pleased to participate and were relaxed and thoughtful during the interview. The interviews have all been transcribed into Lithuanian and twelve have been translated into English. The author has read all the Lithuanian texts, but will only use the English translations for quotes. All informants were given the same set of questions. The interviewer felt free to pursue new lines of inquiry when it seemed worthwhile to do so. The interview material is quite detailed and informative. The interviews translated into English have been coded using NVivo10. A second coding of the same data set in order to establish reliability has not yet been conducted, but is planned. As with the freelist data, the analysis of these data is preliminary and much more nuanced and refined analysis will have to wait. However, I am confident that the main points made in the present analysis are reliable and valid. As it is beyond the scope of this report to provide an analysis of all the data, the focus will be on triangulating interview data with freelist data in order to check the results.

We obtained a sample of forty-three farmers for the animal-in-a-row task. These data are reported last. My main goal is again, to see how the analysis of the data obtained by this method triangulates with the analyses obtained from the freelists and structured interviews, respectively. The mixed methods/triangulation approach, using different samples can, if the methods support each other's conclusions, provide greater confidence in the results of the analysis than the use of any one method alone. By triangulation, I mean that a conclusion obtained by one method is supported by an analysis of data sets obtained by other methods.

The remainder of this paper is organized straightforwardly: the next three sections present abbreviated outputs and brief analyses of the results of the freelists, the structured interviews, and the animals-in-a row tasks, respectively. This is followed by a discussion and a conclusion. In the conclusion future research aims are discussed.

3. Freelist Results and Analysis.

My discussion will focus on the six freelists mentioned above. These freelist questions also spurred much additional discussion which we recorded and often participants would write statements rather than limit the freelisting task to key words or phrases. Thus, the freelists provided an unexpected trove of linguistically contextualized responses rather than only the key words or phrases. A preliminary process of culling and cleaning the freelists is presented here and I am quite confident that it accurately reflects basic keywords that can be used in constructing a cultural model for nature and describing basic cultural practices, decision-making criteria, values and beliefs. The commentary (or Key Words in Context/KWIC) materials were

used to establish the meanings intended to be conveyed by the key words and also to establish semantic equivalence between similar words.

To save space and confusion words have been translated into English (as required by NSF proposal) and Lithuanian words have been minimized. Lithuanian speakers were used to back-translate ambiguous words unfamiliar to the author in order to assure accuracy. Words that are in bold are keywords in the development of a cultural model of nature. The words in bold are particularly elaborated on in the metaphor analysis of the long interviews.

Freelist Task 1: List All the Typical Tasks You Do on a Farm.

For the first freelist we asked farmers to list farming tasks. The cumulative data are as follows: N=32; number of responses=417; Individual terms=287; average responses per person=13.031.¹⁰ The top fifteen responses are presented below.

Figure 1: Freelist Task 1 – List All the Typical Tasks You Do on the Farm.

ITEM	FREQUENCY	RESP PCT
1. Fertilizing	13	41
2. Sowing	9	28
3. Harvesting	9	28
4. Weeding	9	28
5. Ploughing	7	22
6. Care_of_garden	7	22
7. Soil_cultivation	6	19
8. Hay_making	6	19
9. Spraying	6	19
10. Crop_care	6	19
11. Take_care_of_animals	5	16
12. Take_care_of_flowers	5	16
13. Potato_harvest	4	13
14. Cut_grass	4	13
15. Fodder_preparation	4	13

Note that there were 287 total individual responses. It is clear that Lithuanian farmers have many tasks to do year around. The farmers were unanimous in stating that they work all of the time and they take pride in their industriousness. Many noted that to be a good farmer and continue being a farmer it has to be in your blood. They implied quite explicitly, that a lot of labor is involved as well as a lot of knowledge and adaptability to external natural, social and institutional forces. Farmers worked from morning to evening, some stating that they often worked till eight or ten p.m. They frequently complained about getting good workers. With only a few exceptions of small farms (three or less hectares), the farmers interviewed used machines, fertilizer and sprayed their fields and considered this as mandatory if they were going to have good or even reasonable yields. Most wanted more modern machinery. *In sum*: the farmers thought of themselves as hard workers (i.e., industrious or in, Lithuanian *darbstumas*); they thought that to

¹⁰ I eliminated average rank and Smith’s S for now because the data requires more cleaning up and these data would be inaccurate at present. However, I intend to use both, since they are important in determining collective cognitive (or cultural) salience of terms.

be a good farmer, farming had to be “**in your blood.**” Informants were **pragmatic** in their approach, proud of their **autonomy** in dealing with the various outside, and changeable forces, and thought **knowledge** of farming, laws, people, technology, and markets was necessary in order to succeed.

Freelist Task 2: What Thoughts Come to Your Mind When You Think about Nature?

For the second freelist task we asked farmers “what comes to your mind when you think about nature (i.e., *gamta*)?” The cumulative data are as follows: N=32; Number of responses=340; Individual terms=285; average responses per person=10.625. The top sixteen responses are presented below. A sixteenth term was added because it indicates, I believe, a shift to a second cultural model or at least a mode of perceiving nature. I need add that this question was not initially a scheduled freelist question but was added to obtain basic thoughts about nature, to add a scaffolding of keywords that could be used for developing cultural models. I should also add that recent writings about cognition and studies of farmers and ordinary folks and how they think about climate change (Kahan, 2014, 2012; Rejesus et al., 2013; Hameed, 2014) demonstrate that information in general and specifically about climate change is processed in terms of cultural ideals and identity. Thus information about climate change may be evaluated one way in one cultural context, and another way in a context that presupposes (or triggers) another cultural identity. For instance person A may understand and use nature differently when farming then when vacationing. Kahan and his colleagues provide convincing evidence that different cultural identities activate either different cultural models or different uses/interpretations of the same cultural model.

In this sense questions on nature can serve as an indirect means to obtain information about thoughts on climate change. I should also add, as noted earlier, that the term for nature in Lithuanian is “*gamta*”; this is an unambiguous word (as far as words go) that refers to the physical, organic, not human-made environment in which we live. Emotionally and in terms of normative reference, *gamta* refers to the countryside (*kaimas*) and not to cities, though, to my knowledge of having lived for three years, worked and studied in Lithuania, Lithuanians would probably agree that cities are “in *gamta* but not a part of *gamta*.”

Figure 2: Freelist Task 2 – What Thoughts Come to your Mind when you Think about Nature?

ITEM	FREQUENCY	RESP PCT
1. Rest	15	16
2. Peace	12	22
3. Beautiful	10	19
4. Forest	9	13
5. Animals	9	13
6. Lake	10	9
7. Fresh_air	3	9
8. Trash	3	9
9. Birds_sing	2	6
10. Countryside	2	6
11. Pollution	2	6
12. Rain	2	6
13. Health	2	6
14. Childhood	2	6

15. Soil	2	6
16. Crops	2	6

When these farmers think about nature, they do not think of the nature that is the farm and its immediate environs. Instead, they first think of it as distinct from the farming eco-niche. This is evidenced by the fact that the first 14 terms have nothing *per se* to do with farming. These terms are commonly used by city-folk as well and reference a general emotional orientation, an ethos if you will, Lithuanians have toward *gamta* (i.e., nature). Only after what I refer to as the national default cultural model of nature has been “dealt with,” do terms like “soil” and “crops” crop up.

There were 285 individual responses. Many responses were phrases that we shortened for the freelist. The default national conception of nature (a theme I develop throughout this manuscript) is signaled by terms such as “**childhood**,” “peace,” “**rest**,” “**health**,” and “fresh air.” These concepts are linked by respondents to the “**countryside**” which is contrasted with Vilnius or urban living by quite a few of the informants. As a recent Lithuanian intellectual, poet and former Minister of Education commented (in Lithuanian) during an interview, “¹¹there is little or no *gamta* in the city, you have to go to the countryside (*kaimynas*) where you find lakes, forests, fresh air.”

The sense here, albeit conjectural, is that there are two modes of thinking about nature: one is in the relationship of the farmer to her/his farmland and weather, and the other is as a personal relationship in which one is in or a part of nature. In both modes nature is viewed as having force, as being in a sense animated, but not like a human or animal since we live in nature. Nature rather is like a parent, it provides vital resources for us and keeps us healthy and alive. Nature is related to childhood, kinship, the countryside, where all Lithuanians came from. “Fresh air,” “relaxation,” “peace” and other such terms are quite commonly associated with *gamta*. They are used in the sense of a place to return to and reinvigorate the soul, recharge one’s “batteries” (an American, not Lithuanian metaphor).

One can see that this mode also penetrates the speech and freelists of farmers when referring to the farm and farming. Farming is noble work in the sense that farmers clearly project themselves as the suppliers of food to the people of Lithuania. Their industrious work is rewarded financially; but just as important to them, is that their work is meaningful because it provides for others. It is this duality which is apparent in the high frequency of such personal freelist phrases as “[nature]...makes up for the absence of friends;” “our home;” “summers are hard if you just live in an apartment.” In the summer and on weekends many if not most Lithuanians seek to move to their *Sodybes* (like Russian *dachas*), which most have as a residual benefit from Soviet times.¹²

The above data provides supportive evidence for my position that there are two (if not more) major cultural models of nature. A default national one and one that is related to the cultural identity of the farmer as farmer. The first cultural model represents nature as an untrammelled and pure environment where humans can go to “rest” and “recover” from city life. The other is of nature as provisioning humans and which, in this context is also perceived as protean. As a consequence of the protean nature of nature, farmers work hard to control it and, most often,

¹¹ This is not quite an exact quote, but certainly is the gist of the commentary.

¹² Further, an important aspect of Lithuanian history and culture is the nineteenth and twentieth century poetry about nature that Lithuanian schoolchildren learn and recite. The most famous of these poets, Kavolis, remains an important cultural figure in the collective memory of most Lithuanians. For their high school graduation exam there is always some question regarding nature in Lithuanian literature.

succeed at their task. A possible synthesis of these two models occurs in the “authenticity” and the honorable virtues attached to the industrious labor of the farmer. Perhaps we can talk of three models.¹³ This, at present, speculative Hegelian model of nature is shaped by Lithuanian cultural history. As I hope the reader can also discern, the freelist terms particularly those in the second list, plus the statement of the “hardworking” farmer evident in the first freelist, suggest the feasibility of this proposed model. To espouse such an analysis with confidence must wait until much more research has taken place. However, the evidential seeds for germinating these hypotheses is found in these early freelists. We will be attentive to further threads of evidence for the above proposition in the following freelists and interviews.

Freelist Task 3: List All the Ways you Use Nature.

For this freelist the cumulative data are as follows: N=32 number of responses=287; individual terms=256; average per person= 8.969. The top fifteen responses are presented below.

Figure 3: Freelist Task 3 – How Do People Use Nature?

ITEM	FREQUENCY	RESP PCT
1. Rest	20	63
2. Pollute	16	50
3. Take from nature	14	44
4. Protect/take care	12	38
5. Pick_mushrooms/etc.	12	38
6. Make a living	11	34
7. Litter	9	28
8. Work	9	28
9. Live in/part of	8	25
10. Nature_gives	8	25
11. Grow grains	8	25
12. Get Water	7	22
13. Destroy	7	22
14. Depend on	7	22
15. Fish	6	19

The idea of a **relationship** between farmer and nature is developed in this freelist; for all terms mentioned (n=287), 27% (N=77) implied a relationship between humans and nature; terms number 3, 4, 9, 10 and 14 are examples of terms expressing a relationship. The notion that we are dependent on nature is greater than we as the caretakers of nature. This difference suggests again that we are in a relationship, with nature as the more powerful partner. Yet, we also destroy and take from nature; thus humans exploiting nature was a powerful and pervasive theme in the freelist (and later in the interviews). Fishing included many names of different fish, as did mushroom picking.¹⁴ Except for general caretaking, many more keywords signal that humans

¹³This is a point, we will later pursue: that is the relationship of these two models: are they independent, overlapping or is the farmer model a subset or variant of a larger model?

¹⁴We decided for brevity to include berry picking under the “mushroom picking” since it doesn’t affect the analysis and mushroom was the most frequently listed item.

harm nature through such terms as “littering” “destroy,” and “pollute.” That our livelihood and life depend on nature is another re-occurring theme signaled by key words such as: “Depend on,” “get water,” “nature gives,” “live in,” “work,” and “take from.”

Nature was thought of as possessing an **animating** force with particular characteristics. On the one hand humans were the stewards of nature and on the other hand, nature was the steward of humans. Nature is both animated and a biosphere in which we live, which provides resources for life as well as from which resources are taken by force. Though nature gives, it is also seen as whimsical and unpredictable. This viewpoint is expressed in comments expressed with regard to this question, such as: “farmers are dependent on the pranks of nature;” “nature rewards if used wisely;” and “however much effort you put [into farmwork], if summer is bad your harvest is bad.” Nature is not seen neutrally or as an unalloyed primitive good, but through a particular cultural identity that could be construed as pragmatic.

Freelist Task 4: What are the Bad Things People Do to Nature?

For the freelist we asked farmers to list the “bad things people do to nature.” The cumulative data are as follows: N=32; number of responses=186; individual terms=112; average per person= 5.812. The top fifteen responses are presented below.

Figure 4: Freelist Task 4 – What are the Bad Things Humans Do to Nature?

ITEM	FREQUENCY	RESP PCT
1. Trash	16	50
2. Pollute	15	47
3. Waste_resources	13	41
4. Chemicals	11	34
5. Fertilizers	10	31
6. Cut_forests	10	31
7. Don't Recycle	10	31
8. Poachers	8	28
9. Burn_grass	8	28
10. Don't Think	7	28
11. Destroy_ecosystem	6	22
12. Don't Take Care of Nature	6	22
13. I don't do bad things	6	22
14. Dungwash	4	13
15. Destroy_animals	4	13

Comments related to the top three items (e.g., Trash, Pollute, and Waste_resources) were usually made in relationship to specific kinds of trash (plastic bags, empty bottles, etc.) or pollution (of lakes, rivers, forest) rather than made as general statements.¹⁵ With reference to trash, people

¹⁵ Please recall that the freelists are cleaned-up so pollute refers to many different statements informants wrote down or said to the researcher, while conducting the freelist. Freelist questions tended to elicit short phrases or comments rather than just a list of keywords. The shortening of commentaries was conducted by the researcher in collaboration with just one other Lithuanian assistant.

mentioned comments such as “cigarette packages,” “trash after fishing,” “plastic,” “broken buckets” and so on. The focus was overwhelmingly on small-scale rather than large scale activities that the informants had personally observed and were irritated about. Their recollections were triggered by their emotional responses to their experiences of people “not caring about nature.”

Chemicals, fertilizers, and dungwash were acknowledged by farmers as “bad,” but also as “necessities” (“*būtina*”). For the most part, farmers ignored industrial large-scale pollution. Six of the informants (18%) said that “they do not do bad things, others do.” More generally, they attributed these bad things to people “not thinking” or “caring” about nature and that this thoughtlessness led to the actions that lead to “destroying the ecosystem.” In short it seemed that farmers thought locally, their responses triggered by recollecting their emotional response on seeing or experiencing such bad things as done by others. Implicitly and often explicitly informants separated themselves from those who do “bad things” to nature. They acknowledge that they also do bad things, but these do not have the moral weight of bad things done unthinkingly and due to a lack of care or understanding. Their “bad things” are a result of necessity and have to be weighed in terms of the “greater good”—provisioning all Lithuanians with food. Thus, one type of bad thing is done volitionally and without thought; the other is done out of necessity and with thought. Their thoughts of nature as related to the bad things people do to nature are, thus, shaped by their cultural identity as farmers and being caught up in a capitalist modern system which requires massive yields using fertilizer and other methods for maximizing yields.

Figure 5: Freelist Task 5 – What Problems Do you Encounter in Farming?

For this freelist the total number of informants=32; total number of terms=107; total number of responses=129; average number of responses per person=3.909.

Figure 5: What Problems Do you Encounter in Farming?

ITEM	FREQUENCY	RESP	PCT
1. Bureaucracy	25	78	
2. Pests	16	50	
3. Unstable_weather	15	46	
4. Unstable_produce_prices		12	38
5. Plant_diseases	9	28	
6. Shortage_of_good_workers		9	28
7. High_taxes	8	25	
8. Financial_money_problems	7	21	
8. Can't_be_lazy	7	21	
10. Laws_change_frequently	7	21	
11. Not_knowing_what EU_payments will_be_next_year	5	16	
12. Expensive_repair	5	16	
13. Events in the Ukraine		4	13
14. Theft	4	13	
15. Poor soil	4	13	

By far, “bureaucracy” was the most frequently cited term. Many of the other terms in the above list were also related to bureaucracy (see for example, items number 7, 8, and 10). These comments signal quite clearly the farmers’ frustration with many newly implemented bureaucratic policies. Many of the policies and requirements simply seemed unreasonable and made no sense to the farmers (according to them). EU policies are seen as separate from those of the Lithuanian government. The EU is said to provide some benefits in terms of subsidies and various incentives to create associations, implement sound environmental policies, and obtain new technologies.

As with the freelist question on “bad things,” responses tended to be local and experiential, focusing on problems the farmers personally encountered. For instance, a sample of statements regarding the bureaucracy are: “too much paperwork;” “difficult to understand the paperwork;” “unpleasant government employees;” “changing paperwork requirements.” The difficulties encountered with bureaucracies were linked to an unstable economy and to complaints about the shift in their work ratio from being behind the plow to being in front of a computer. As Sapir wrote about “spurious cultures:” “the great cultural fallacy of industrialism...is that in harnessing machines to our uses it has not known how to avoid harnessing the majority of mankind to its machines” (Sapir, 1924: 411). Farmers liked their work and viewed farming as something “in their blood,” but this feeling did not extend to the perceived increase in bureaucratic restrictions and work. Many noted the general rise in prices of machinery, the instability in prices for crops after harvest, and unpredictability of the economy.

Farmers also noted changes in the weather and in a consequent increase in pests. Not all made this relationship explicit in freelists, but some did. For instance statement related to bugs and weather frequently followed each other in freelists (I have not yet analyzed this quantitatively). Farmers wrote and spoke as follows, “there has been an increase in Colorado beetles,” “there are now more ticks because in winter they don’t freeze,” “it is hard to predict the weather,” “nature has become unstable.”

Farmers complain about the instability of prices and don’t seem to know either how much things will cost them or how much return they will receive from their harvest. In the interviews complaints about unstable prices, and higher prices for machine repairs, government and EU environmental policies that increase the prices were extensively and energetically expressed. In terms of work shortages the farmers complained that workers drink too much, are lazy, and receive unreasonably high unemployment benefits that exceed wages. Though what is surprising is that unskilled farm labor wages are quite high compared with wages for other unskilled jobs, they averaged around 30 Euros per day. However, the labor was usually difficult and workers complained that farmers made them work over time without paying them. All farmers complained about the shortage of laborers as well as the laziness and high alcohol consumption of those workers they hired. A few noted that they had steady laborers that had been with them for a number of years; these farmers considered themselves lucky and paid higher wages as a result.

Another dimension of problems was the people in the community. Farmers not only did not trust the government, they mostly did not trust their neighbors. They complained about a lack of “community support,” and “theft.” A common Lithuanian saying, oft repeated by farmers, is that “a neighbor is never so happy as when they see their fellow neighbors field (or house) burning.” In many years of collecting freelists asking Lithuanians to list the main character traits of

Lithuanians, jealousy (“*pavydas*”) always comes up first or second (the other being “*darbstumas*” or industriousness).

In short, the farmer sees him or herself isolated. The sole allies are typically within the family, and approximately 50% of the farmers ran semi-independent, joint farms mostly with their son. The husband-wife bond also seemed strong and in interviews the two considered themselves a “team” with the quieter partner listening and speaking freely, even at times disputing a statement by the lead speaker. In terms of problems (*problema*) the farmers saw themselves as fighting the government, the weather, the economy, and their neighbors. As a consequence of this they state, with seldom a hint of complaint, about the amount of work one has to put into farming on a daily basis (“one can’t be lazy”). It is a model that is elaborated on in the interviews of the farmer as hardworking and having to fight many natural as well as cultural forces (other people, government, economic system). The farmer does not portray him/her self as heroic, rather as hardworking and honest and having to have great knowledge to be successful (see interview data).

Freelist Task 6: What are the Effects of Climate Change on your Farm Work and Productivity?

For this freelist task the total number of informants=32; total number of terms=103; total number of responses=114; average number of responses per person=3.563.

The question received fewer responses than previous questions as most of the farmers rejected the fact that there was climate change on a global level. Also there were few single word or short phrase answers. The list is more difficult to “clean up” than others simply because it was difficult to combine gists of sentences into single categories, particularly when there was a lot of overlap in meaning but not necessarily semantic equivalence. A further cleaning up would be required to obtain more accurate frequency counts. However, the gist of the findings I am confident on are represented below. It may also have been a problem that the question as asked is perhaps too leading, since it takes the existence of climate change as a given. However, the responses of the farmers were quiet interesting in most of their explicit rejection of this assumption. Also some would answer that there is climate change and later that there isn’t. We only list the top ten terms simply because the range of variation was not so great, and the answers were almost always presented in sentences.

Figure 6: What are the Effects of Climate Change on your Work and Productivity?

ITEM	FREQUENCY	RESP	PCT
1. Warmer/Snowless_winters	13		25
2. I_don't_feel_climate_change	11		36
3. Climate_changing_very_much	10		33
4. No_effect	8		25
5. Childhood weather very different	8		25
6. Unstable_weather	8		25
7. More droughts than before	7		22
8. Diseases	6		19
9. Hard_to_tell_in which direction changing	5		16
10. Plant/harvest rot	5		16

Most of the farmers made comments acknowledging particular changes in the weather. Again these responses were local and based on their experiences. Common responses were “everything happens earlier,” “doesn’t affect me much because I have a small farm;” “The hot evenings are bad for spraying.” Further, many answers were expressed phenomenologically, as personally experienced: “the weather was colder during my childhood;” “The winters are snowless.” But when asked about climate change more globally most would deny it as a global phenomenon: “I don’t feel climate change;” “I don’t worry;” “Hard to tell...”. The rejection of global climate change was particularly evident in the interview material which we will turn to shortly. Farmers think locally and while they are quite cognizant of local changes in the weather and adapt to them, they are hesitant to generalize their immediate understandings to more global and permanent changes in the climate. Further, the effects of climate change have been inconsequential largely because they have adapted with different or better fertilizers, more spray (i.e., insecticide), and crop rotation strategies. They also talk of planting different types of seeds, ones adapted to warmer temperatures. In short, while they notice the effects of climate change, they see it through their own experiential lenses. What overwhelms them most is the changes occurring in government and EU policies, changes in technology and market prices for what they want and need to buy and the price of their crops on the market place.

4. Semi-Structured Interviews.

The series of questions asked all thirty seven farmers interviewed are in List 2.

List 2: Topics and Questions for Semi-Structured Interviews.

About Daily Activities:

1. Describe your work/job (which relates to primary food production).
2. What is your typical work/work-day? What is the rhythm of work in this area?
3. What are some of the important skills and experience you need to be a successful food producer?
4. What kinds of lands are most productive for farming (meaning lowlands/highlands/dark soil/light soil etc.)? What kinds of things do you need to do to make your fields most productive? Are there material things you need to make your fields more productive (meaning equipment/fertilizer/seed types, etc).
5. What forces besides human and material things can affect your productivity (meaning supernatural forces such as gods, or nature, climate)?
6. What makes plants or animals grow healthy?
7. What are the key decisions in farming one must make to be successful? What information do you need to make decisions? How do you choose what crops to grow or animals to raise?
8. What are some of the constraints/problems you face as a food producer?
9. Do you believe there are supernatural forces that affect your farming success?
10. How does the government (or NGOs) help or hinder your farming?
11. What do you like/not like about what you’re doing (satisfaction)?
12. Are there things you have to do that are not good for the environment but are necessary for successful farming?

About Climate Change:

1. What changes have occurred in your work over the last 10 years? What changes have occurred in your environment over the last 10 years?
2. What are the reasons for these changes?
3. Can you suggest what humans can do about the changes that you mentioned above?

In this section my goal is to extend the analysis begun with the freelist data.¹⁶ The farmers provided information on the processes of farming, ecological versus chemical farming, cattle versus cereal farming, economic decision making, machinery, and government policies. Not all these subjects can be adequately covered. My main focus will be on material that can be used to develop one (or more) preliminary cultural models of nature; and, secondarily, to examine how one or more cultural models of nature can logically and feasibly affect farmers' responses to climate change. I provide a preliminary analysis that expresses the gist (D'Andrade, 2005) of their comments with attention to their cultural model of nature and their relationship to nature. A metaphor analysis is in its preliminary stage and what I consider to be significant metaphors are presented below in bold. I am only using the English translations for these metaphors.¹⁷ I also focus and seek to expand the key points developed through the analyses of the freelist tasks, particularly with regard to two distinct cultural models of nature: one based on a general national ethos of *gamta* as a place for leisure, peace and recuperation from city life; the other being an occupationally derived model of nature as a valued and unpredictable resource one uses and wrestles with to be a successful farmer. The metaphor analysis that is used here is both inspired by and derived from the works of Quinn (1987, 1992, 1997, 2005) and Bennardo (2008, 2009).

My analysis below is subdivided into three sections: ethos, eidos, and relational. The configuration of ethos developed below comes largely from the interviews themselves and is focused on the farmers' conception of their own self identity and general world view (Kearney, 1984). Each provide different aspects or "views" of cultural "models of nature." This approach owes its inspiration to Bateson's analysis of the Naven ceremony among the Iatmul of Papua New Guinea (Bateson, 1958) and is not intended to segment and separate as much as to seek an integration of different vantage points farmers use in discussing nature in the context of their lives as farmers.

Let me clarify three concepts briefly here: cultural models, self, and world view (a more extended description is in de Munck, 2013). Cultural models are shared mental configurations that are activated in the relevant contexts. The self is, in part, a diffuse "self symbol" that organizes cultural models into larger socio-cultural identities. A world view is in my use of the term (via Kearney), a macro-cultural frame that sets interpretive parameters (i.e, variable and values) for a number of socio-cultural identities of a population that defines itself as a large socio-cultural group (coterminous with national/religious/ethnic cultures). For instance the importance and high value placed on industriousness, the sense of a fused identity as farmers, and the low value placed on bureaucracy by Lithuanian farmers (all three of these world view components are discussed below). These three concepts are seamlessly integrated into the whole person. Ethos, then is simply a short-hand for the emotional configuration or stance that farmers

¹⁶This is not to say other questions or materials are to be dismissed, but that this is the first go through of these data, and I'm focusing on only that which stands out and segues with the analysis of the freelist materials.

¹⁷It would be disingenuous to give word counts of metaphors at present given only 12 of 37 interviews have been translated and I have not yet made a systematic metaphor analysis. This is preliminary but as noted before gets at the gist of informant statements.

take as part of their cultural identity as farmers. As Bateson defined it, ethos is “the system of emotional attitudes which govern what value a community shall set on some satisfactions or dissatisfactions which the contexts of life may offer” (1985: 220). It is important to recognize that this system of emotional attitudes is, in this context, a property of the person’s socio-cultural identity as a farmer and not necessarily other identities the person may take on.

4.1. Ethos- A Partial Analysis: Farming is in the Blood.

First, farmers consider that farming is **in their blood**, a good farmer is **born to farm**. In this sense the farmers perceive themselves as “natural” (though this is not a language they would use). Farming is not just an occupation that one turns to, like plants or animals it grows into the person from birth. Though we did not ask, all farmers came from rural areas and had experience with farming from childhood. However, given Soviet times when there were only collective farms (*kolūkis*) and land was divided into fairly small parcels after independence (in 1991), most of the large farmers “grew” their farms as a result of their own ambitions as land has, and continues to be, quite cheap and often can be leased from the government for nominal prices.¹⁸ Farmers thus see themselves as enterprising, hard workers, free from the constraints of collective farmers, and in short autonomous proud human beings.

“Audriui,” a fifty-seven year old farmer sitting side by side with his wife, describes the ethos and conception of self that most of the farmers hold in the following passage:

You have to be born [a farmer]. (*laughing*). Or to study it well and have a lot of practice because a farm is not some kind of a store – here you bought this, resold it and you have a profit. It is hard to even calculate that profit here. Because so many things depend on the climate and on the fertility, on the breeds and cultures...also on the time you choose to sell your grains, whether you will be able to wait, and how you will predict changes in price. And finally, it also happens that they foist on you bad quality stuff, just like it happened to me one year, they sold me an unconditioned seed. So instead of rapeseed I see that there is something else (“*garstukas*”) growing. ... So here you go, ‘big money and no return,’ as they say. So you can be very successful in farming but one year it cuts you and you can go bankrupt in a year.

Other farmers made similar kinds of comments such as this one by Donatas, “during the winter I look at the fields and wait for the spring to come faster, thinking how I will cultivate the land. That is inside a person. That is what I like.” Rimantas said, “You have to like everything, you know, if you are farming. If you do it, you have no other choice. If you don’t like, then you can not work at all.” Yet another of the interviewees said,

Here is the beautifully tilled earth, sprouting crops, growing. So, you contribute everywhere, you know what your hand has touched upon. You can somewhat

¹⁸ The “farmers land holding” laws said that one cannot hold more than 80 hectares; however, farmers could lease land from the government to add to that. In 2015 an amendment was passed that legalized the buying of Lithuanian land by foreigners. This bill was strongly opposed by Lithuanians rich farmers, nationalists, and also the green party and green party types. Farm land had been quite cheap in Lithuania and farmers could easily expand their holdings if they were ambitious and hard-working.

change the course. I would say it is like hunting, it is not just for making a living but also it gives a lot of this...such.. well probably no one, if he really does not like it, he does not farm, does he?

None of the farmers interviewed said they did not like their work. All implied, if not directly stated, that farming is what they do and their identity as farmers seemed to be, as Whitehouse and Lanham (2014) write, “fused.” By fused they mean that the specific fused identity is not one of many identities a person shuffles through depending on context. If an identity is fused, then, among other things “...individuals demonstrate a significant willingness to sacrifice themselves for their groups” (ib.: 676). A fused identity is not perceived by the person as a role to play, a performance that is somehow not connected to one’s core self, the fused identity is an essential feature of that core self.¹⁹

Farmers uniformly described farming as hard work, that took up your time and life. None complained about this, rather they complained about the “paperwork,” the non-farming aspects of their jobs that seemed to take up more of their time every year, and which served predominantly to constrain their autonomy and narrow their actions to those dictated from “above.” They not only accepted the difficulties of work that is directly related to farming, they seldom complained about the lack of funds or their desire to become rich. Economics was important, but it was integrated into the work and not the reason for or the goal of their work. Their goal, aside from providing for their family, was to provide food for the nation. They rarely talked about this in the idiom of “sacrifice” but more often, if at all, in the terse language of work—“this is our work.” One farmer combined both idioms saying that, “to do my work requires me to completely sacrifice my free-days, holidays and vacations.”

In short, the farming ethos presented by the farmers interviewed also is one that entails a fusion of the self with his or her identity as a farmer. This particular cultural identity emphasizes hard work, providing for one’s family, caring for one’s land and animals, doing a good job that was done thoughtfully and with attention to detail, and also a sense of serving or provisioning the country. Industriousness and a sense of personal autonomy, self-determination and competency are core components of their ethos. Here, by ethos I do not mean a general emotional configuration that is supported through primary and secondary cultural institutions, though this may occur, we have not studied this. Rather, as noted above, I mean a general sense of themselves and their place in society as farmers that entails an emotional configuration of **rational stoicism**.

Whitehouse and Lanham note that the fused identity is one that seeks to be a member of a group and that is “pro-group action” (2014: 676). This was not directly expressed by most farmers, though they indicated counterfactual support for favoring “pro-group action” by stating that there was not enough of a union or solidarity among farmers. Farmers also expressed a desire for wider social ties of cooperation and amity. For example Jonas said

That person who is closed...has built a wall...will reach for everything [himself]...it is harder for those people. That makes me believe that the person who was honest and openhearted, who, it seems, gave you by taking away from himself – somehow it comes back to him. It is a joy that it comes back. Believe

¹⁹ A word of warning; I am not implying that all farmers feel this way, or even all we interviewed; however, many did assert this without us looking for it, thus this data came voluntarily, from “left field” so to speak. It was not part of the research agenda to consider identity and conception of the self.

me, maybe it is not so relevant to you but in my age it is very...satisfying.. If you give to another person and you know that person needs it. It is very pleasant to give then.

Rimantas said, “In my opinion the main problem in agriculture is how to unite all the common farmers, all the smaller farms and give them more attention than to the big farmers. I think that is the biggest problem.” Dite (a thirty-six year old farmer) said, “You need to have an environment, you need more people so that you could feel safer. When that circle of people is wider you don’t need to buy something, you can go to the other person to ask [for help]. That is important but so far there are not many people.” There is a desire for amity and developing wider social ties, but for many reasons, in part emigration and the long hours of work, few close connections seem to emerge between farmers. People keep to themselves.

4.2. Eidos: Without Knowledge you will Fail.

I chose to use the term *eidos* (coined with reference to cultural configurations by Gregory Bateson 1958) as a complementary contrast with *ethos*.²⁰ *Eidos*, is the logical machinery through which you think about how to behave and make decisions. It is distinct from the intuitive and emotive basis for action in that it is reflective, intentional, and more or less, the reasoning can be articulated by the person. Bateson writes that Iatmul culture (his fieldwork site in Papua New Guinea) had “some internal tendency to complexity, some property which drives it to fabricate and maintenance more and more elaborate constructs” (1958: 216).²¹ This is what the farmers also point out—a general evolution to increasing complexity both driven by new technology and increasing bureaucracy. In a sense, though with important differences, this is what Earle and Johnson (2001), invoking a materialist model of socio-cultural evolution, among many others have referred to as the causal chain beginning with population growth, environment degradation, depletion of resources that then lead to the following forms of responses—risk management, intensification, and innovation. *Eidos*, then is an underlying culturally normative adaptation encouraging and rewarding a focus on intellectual/cognitive activity. Thus, the farmers we interviewed do not reflect the more classical portrayal of “peasants” as conservative and tradition bound. Farmers valorized the pursuit of knowledge and many rued their own lack of knowledge. For instance, Linas, a relatively new ecological farmer said:

The main problem is that we do not have experience. We do not have correct experience and little knowledge. Those would be our personal problems. And also that we want things fast, that everything would happen here and now, and would be perfect.²²

Similar statement were made unbidden by many of our non-ecological farmers. The acquisition of knowledge was a major theme for all farmers. The importance of **knowledge** was emphasized eloquently by Jonas.

²⁰ We are indeed aware that the term has a lineage back to the Ancient Greeks. However, there, it was used as Bateson notes in a far different way than he uses it (1958:212fn).

²¹ The passage has been slightly modified, while retaining the gist, to make it slightly more intelligible.

²² Linas and his wife had been “regular” farmers for most of their time as farmers, but switched for ideological and economic reasons.

Your knowledge needs to be applied everywhere -- it is like the driving force that allows you to improve yourself. Anyway each year is different. And that knowledge every year needs to be applied differently. Or also it happens that you need to oppose your own beliefs and knowledge. There is not one year that's the same like before (*states firmly*). And each year you have to look at your knowledge and continuously add to it, so that... Each year opens something new. And it is very joyful to see that...that you make progress. And...Yes, indeed it is fun.

Knowledge is a driving force that is inherited by being a farmer. It is an internal driving force that can even oppose one's own beliefs. Without this force one fails as a farmer because one cannot adapt to the different and continual changes that come from both nature and nation. Bateson's "internal tendency to complexity" is reflected by the farmers as a requisite for being a successful farmer. Milda provides a good account of the many levels and kinds of knowledge required to be successful:

So you go into the fields and look. Depending on different species of plants: some species ripen earlier. It depends on soil. Also when certain chemicals were applied to that soil. So you see, you can see from a grain. You carry them, look at the moisture...if it is dry then all is good. You start threshing from that field. You decide everything yourself – when to spray, when to sow, when to do anything. You have to make the decisions yourself. Because nobody will tell you from the consulting service when to sow your field. Maybe it is still wet in my field. I would go to work in that field but it is still a puddle there so I start with another field this year. Or when to thrash. The same species can ripen faster in one soil but later in a different soil. Maybe soil is different there. Sometimes...mmm...even two days difference in sowing makes a difference when to thrash. Every decision needs to be made on the spot and in time.

Some farmers signal their knowledge competency indirectly, by noting their lack of knowledge. This lack is then connected to the increasing demands for the acquisition of new skills and knowledge just to keep up with the new innovations and policies. The quantification of knowledge (i.e. having more or less) is directly correlated to vectors of unpredictability: the national and EU bureaucracies, the global market place, and the weather. Petrus, who recently had expanded his farm lands to over 100 hectares said,

I think we lack knowledge. But really, I don't know, it seems that you accumulate a lot of knowledge in so much time. Sometimes I (...) maybe I look funny but sometimes I compare that what I studied and what knowledge I received [as a student] and I think that if my professors had taught me back then [what I know now] I would have really become a rich man.

Implied is that while Petrus has a lot of knowledge, it is not enough. His knowledge now is like a professor's, but he is not a rich man; he accumulates knowledge but still there is a lack. Rimantas, a 48 year-old farmer, made a similar comment.

Well, knowledge... perhaps none of us has too much knowledge. Specialization is not so important now anymore. The most important thing is choosing the right technologies. So, for example, if you grow grains or potatoes or the same crops for animal fodder production, then it depends on each plant and it is different in the case of each plant, it depends on the area where you live, on the terrain, on... Really, I would say it is a very individual thing. It depends on the structure of soil, on its shape, the fields. One cannot know all these things.

Petrus statement suggests the Faustian nature of knowledge—there is never enough and rising complexity outstrips our capacity for acquiring knowledge. Technology mediates the relationship between the farmer and external factors: the plants, soil and weather (in short “nature”). Making good decisions entails knowing how to use the new technologies and why and when they should be used. The increasing complexity and reliance on technology adds another layer of information one needs to be knowledgeable of in order to be successful. As in the quote by Petrus, no matter how much knowledge you have, there is never enough.

In a similar vein, Aldona, speaks about the importance of knowledge and acquiring up-to-date information in order to succeed as a farmer. She and her husband own a cattle farm/ranch of 60 hectares.

...I am not a specialist from that field but I have become quite good specialist in cattle farming. Quite good. My husband does not intervene in what I order, what minerals [I buy] nor...nothing...nothing – I do everything myself. There is plenty [of information] now. If you want to know. If you don't want to know that you can know nothing. But if you are interested, not so much interested but if you need to know because you will not be able to do something properly otherwise. Because if you don't know anything, you are not interested in chemical substances then how will you apply them properly with plants?

The instabilities in the natural, political and economic environment—both natural and human-made—promote a kind of Faustian feed-backloop in which change is ever more varied and affects qualitatively different vectors, thus knowledge acquisition never ceases. The pressure to “keep up” increases and leads to feelings of anger and frustration, reminiscent of Lakoff's (1987) metaphor analysis of anger as represented by pressure increasing inside a container (as in the statements “pissed off” and “boiling mad”). This Faustian bargain result from change or rather, instabilities in three qualitatively distinct systems: the climate, the market place, and the government. While the acquisition of knowledge and hard work are taken as positive values, implementing them on a meta-system of instabilities leads to frustration. The farmers' responses are captured in the following two quotes: the first long quote below is by Rimantas:

Well, with farming...(pause). You know, finances sometimes do not match. Maybe the right farming branch has not been chosen or what the hell? But, what do I know, we work a lot, we work. We have pretty good machinery that we bought ourselves. We work a lot, we work consistently. (...)We need to try harder. So, for example, this year I made a mistake with those winter [crops] and it is going to be a little bad for us. So. But anyway, we sell our cattle and everything.

Well, right, (sighs) the stability of prices today...eee.. Prices are very unstable. What concerns the cattle farming – last year we sold maybe seventeen bulls. (...) But this year the price suddenly plummeted to four litas, fifty cents (approximately, 1.5 Euros). So we lost somewhere about one litas fifty from each kilogram. Or one litas thirty somewhere.. That would be... And the same with grains. And, for example, the prices of fuel or fertilizer do not drop

Here the complaints are related to the government and the market and the changes seem to be due to environmental instabilities that cannot be anticipated through knowledge. The farmer is at the whim of these vectors of instabilities. The second quote, by Linas, reflects more on climactic instabilities: “The climate is changing so the new seeds, you know, I think are intended for warmer weather but it froze, and the new seeds are not so resistant to the freezing as the old seeds, so the plants died.” In a similar vein with regard to new seed types, Rimantas said that the weather is changing and that “We used to have really big crops coming from fall and they would not rot. But now breeds are not very resistant. And all kinds of diseases attack them (...).” Almost all the farmers complained about an increase in ticks, aphids, beetles and various other bugs, as well as the unpredictability of the weather (e.g. “Snowless winters,” “rain downpours when there should be snow”). Knowledge regarding the weather and reading the signs, no longer work as they once did.

All the above quotes emphasize the individual as an independent agent: Jonas says that “you have to look at your knowledge and continuously add to it;” Milda notes, “You decide everything yourself;” Rimantas notes that knowledge is “an individual thing;” Petrus reflects on how “I could have been a rich man” if he had the knowledge back then that he has now. It seems to me, and here I also use my familiarity with Lithuanian culture and people, that there is a difference between this sort of autonomy and an autonomy that refers to a condition of unconstrained freedom to act as one pleases (one often associated with U.S. individualism). The speakers are all aware of constraints and forces that act on them and on the land. Within this changeable, unpredictable, fluid world they must make decisions autonomously but rationally and with knowledge. Autonomy in this sense is a natural birthright interwoven within a socio-cultural environment and developed out of necessity. Without a sense of personal autonomy that drives one to learn and acquire knowledge, the farmer fails. **Being in the blood** makes this acquisition of knowledge, “interesting” as Milda said, and even “fun” as Audrius noted. The farmer perceives him or herself as an autonomous, hardworking knowledgeable agent who provisions the (often ungrateful) nation with food.

There is a convergence of vectors of instabilities that farmers are cognizant of and seek to adapt to. However, instabilities imply random change and randomness is not something one can acquire knowledge of. Thus farmers valorize and emphasize their knowledge but at the same time are frustrated by contexts in which there are no legible directions or patterns of change that they can anticipate. This frustration seems to be both compounded by and laid at the doorsteps of the government. These complaints may well be a product of normative “complaint discourse” narratives but even if they are, they reflect a troublesome disconnect between the farmer and local, national and transnational political and economic structures, agencies and policies.

4.3. Relational Metaphors.

Only when farmers are asked if the land they farm is a part of *gamta*, are they likely to reflect and answer “yes.”²³ Otherwise their default or heuristic representations, in terms of talking about farming, seldom refer to *gamta*. Farm land is work land. However, as I hope to show in the following section, the material collected particularly in this relational section, suggests that the cultural model of *gamta* as *gamta* (and not as directly referencing farm land), partially underlies and frames their attitudes and ideas about farm land and the work of farming.

In all the questions about farming, farmers discussed “soil,” “plants,” “seeds,” farm “animals,” “pests” and so on, but they did not refer to any of this as “*gamta*.” However, in our preliminary metaphor analysis of the interview material (not all of it has yet been transcribed or analyzed), nature is seen as the **container** we and everything else is “in.” This “container” metaphor is the master or dominant metaphor used by farmers when talking about nature. Thus climate, people, animals, weather and so on are all in a part to whole relationship to nature.

Second, this part-whole relation is seen as a specific type of relationship. One aspect of the relationship is causal; with nature being the **primary cause** for either farming success or failure. The farmer’s success depends on, or is determined by nature and there is not much humans can do about this. Another aspect of the relationship is that nature is not simply a resource or force; it is **animated** as it is indicated by many of the quotes provided above and also in the list below. Sometimes, it is given a **personality** as being “friendly,” but usually it is seen in the role of provisioning humans. A third aspect of the relationship is that humans can and often do **exploit** nature, thus befouling it. Fourth, many indicate that the ideal relationship between humans and nature is one of **balance**. Some argue that such a balance exists, others that it does not, all however use the metaphor of “balance” in their talk about the relationship of nature (or climate or weather) and making farming decisions. The lack of a balance is mostly, if not always, blamed on man’s exploitation of nature. These metaphorical types of relationships are, I hope, apparent to the reader in the fifteen quotes presented below. They should be important in the next stage of the research to determine if there is cultural consensus on these metaphoric types of relationships postulated between humans and nature.

List of Metaphorical Statements about Nature and Its Relationship to Humans and Farming.

1. I know that it is good all this being green and the nature being green and beautiful but again **you don’t need to force too much into nature...** [metaphor – container]
2. Also the spread of diseases. Because **if there are too much of something in nature**, then it has to be destroyed (referring to the bugs that germs and bugs that spread diseases). [Metaphor – container, balance]
3. Everything is grown **in and [its success] is determined by nature’s conditions**. [Metaphor container and cause]

²³ In writing this, I envisage that some Lithuanians would disagree, particularly academics; but this would be a foolish argument in the same way that arguing that the English “tree” and the German “*baum*” are denotatively distinct is a foolish argument.

4. Nature **cleans out itself, [it will clean out] what is not necessary**. So if there are more animals of one kind, then some disease appears and they die out. [Metaphor– balance]
5. So, again there is no emptiness in nature. If... We've seen what is good from the land that's left to shrubs – clouds of ticks have appeared, we can't exit from nature. [Metaphor– container]
6. The new farms somehow better fit into nature. [Metaphor – container]
7. It is the only friend and the only enemy. Nature. Only nature. You can wish for whatever. [Metaphor-animated, personality]
8. Everything depends on nature. Everything. The main factor. Nature and government! Nature on one side and government [on the other side]. [Metaphor–primary cause]
9. But you know, you can't regulate much with nature. [Metaphor– primary cause]
10. Nature does a lot (“*gamta daug ką daro*”). You may raise an animal well, and take care of him but if nature does not allow (“*jeigu gamta neleis*”) then you may even have a loss, losses start from that. [Metaphors – animated, primary cause, personality]
11. Well, you know, there is nothing good for nature in what we use. I think that our land is too saturated and all those... Fertilizers are not very...I don't now, they are mainly all kinds of polyethylenes... I think, that soil has been exhausted too much, maybe. I would think so. [Metaphor – exploitation of nature]
12. Nature has changed a lot. And so, as I say, all the consequences start with nature. If nature does not give much, you know, a farmer cannot do much sometimes. (“*Jeigu gamta nelabai ką duoda ir, žinokit, čia nelabai ką tas ūkinikas ir gali padaryt kartais.*”) [Metaphor– personality, animated, primary cause, container]
13. First of all, what we lack and what we need is wisdom about nature, understanding laws of nature and seeing because there are a lot of hidden dangers that we did not see in the beginning. There are such small creatures as ticks and worms. They did not seem very dangerous to us but it turned out to be bigger enemies than we thought. Yes, little worms in water. For example, we walk and there seems to be a clean spring but you need to know whether it is really clean: you walk all the way to the source to see. Because most often the source is in arable land. We look for springs by searching for yellow leaf thistle and cuckoo flower. If they grow, then we go all the way upstream and see where it comes from and then we drink that water. So these small creatures are such...that is the first thought that comes to my mind. And this year we started seeing nature as our provider. It is our food and even our medicine. [Metaphors – animated, personality, primary cause, container, balance]
14. For example, our friends started to live like us and we know that goats are not good for nature. For Lithuanian nature. Because they graze everything, down to nothing and the place where goats grazed for a few years looks like a waste land. [Metaphors – exploit nature, balance]
15. I think that we are a part of nature and a very natural, very natural part, very blending it, it's only that there is a lot of us. But perhaps that is natural too and nature will naturally take care of that sooner or later. We are a part of nature and everything is kind of ok. [Metaphors – container, balance, primary cause, animated, personality].

4.4. Summary of this Section.

This preliminary metaphor analysis of the human-nature relationship suggests that, at least for Lithuanians, a cultural model of nature is founded on a relational view that connects humans with nature. Thus, there is no cultural model of nature that does not somehow or other include humans and pertains to human motives. D'Andrade wrote similarly about the relationship between cultural models, or schemas, and motivation (D'Andrade, 1992; 1995) as did Matthews (1992; 2005). This, in itself is an important finding, but should not be surprising and strengthens the vision of cultural models, or more generally the relationship between the individual, cultural and cognition propounded so forcefully and convincingly by Hutchins in his book *Cognition in the Wild* (1995). Cultural models are constructed from daily life and therefore are never isolated from human desires, anxieties, and understandings of themselves, others, their relationship to those others and their physical environment (or nature). This point was also propounded earlier by Hallowell (1955) who combines others and nature in his concept of "behavioral environment." Most recently this idea has been developed and given further support by de Munck (2014), Bennardo and de Munck (2014), and the work of Kahan and his colleagues in the Yale, culture and cognition project (2008, 2010; 2012a & b, 2014).

In the ethos sub-section we see that nature and humans relation to it can be viewed in terms of an ethos that binds or fuses the individual to farming and through farming to land, plants, animals, weather, as well as social, political and economic forces. Farming is in "her/his blood." As a consequence there is no leaving, it is, in Sapir's (1924) words a "genuine" cultural-work relationship rather than a "spurious" one. In brief what Sapir means by "genuine" in relationship with the case of Lithuanian farmers is that no act is without meaning, the "major activities of the individual must directly satisfy his own creative and emotional impulses, must always be something more than means to an end." He contrasts this with jobs such as his famous "telephone girl" example in which the individual is harnessed to a machine and the activities of the job are inherently meaningless and do not engage the telephone operator (Sapir 1924: 411). Her work, as Sapir notes, is highly efficient and at the same time "an appalling sacrifice to civilization" (ib.: 411). The fused farm identity motivates the farmer to work hard and take care of things directly as best s/he can—her actions are meaningful.

However, the (forced) relationship with the bureaucracy disengages the farmer from farming. In this sense one can say the Lithuanian farmer is caught in a dialectic in which life is out of balance in two ways: first exploitation of nature creates an imbalance between the farmer's capacity to make good decisions and the increasing whimsies of the weather; and second, the increase of paper work in proportion to actual farm work creates a further imbalance between the genuine culture of farm-work and the spurious work demanded by the bureaucracy. In part, as a consequence of the fused identity with her farm and the perceived instabilities of the various external forces (e.g., market, government, nature) around her, the farmer sees herself as an autonomous agent that can only rely on her own abilities. But these abilities are to be engaged in genuine rather than spurious cultural work.

In the eidos section, this analysis is extended so that the farmer privileges her knowledge and acquisition of new knowledge in order to be successful at the task of farming. The idea of farming being in the blood articulates neatly with the importance of knowledge, because the knowledge he needs is about those skills and notions which he is naturally motivated to learn about. Acquiring knowledge about farming is not the same as a student majoring in physics taking a class in accounting (or vice-versa); rather it is more akin to a born-again Christian going

to bible classes. Farmers do not talk disparagingly about acquiring knowledge concerning farming, and they are eager to discuss their knowledge and dispense with kernels of wisdom about farming. The only knowledge type that farmers speak disparagingly of is that related to “paperwork.” But the paperwork stems from the government and not from nature. Thus, it is fair to say that knowledge about farming fuses their identity with nature in a secular analogue to Whitehouse’s (2004) conception of an “imagistic” mode of religiosity, while their relationship to government generated aspects of farming is more “doctrinal” and routinized, born out of bureaucratic necessity. It is this fusion of *eidos* and *ethos* that is reflected in my description of the farming *ethos* as **rational stoicism**.

5. Animals-in-a-Row Task.

We conducted animals-in-a-row task with forty-three informants. The sample was also a sub-set of the semi-structured sample. Interestingly, the farmers with the largest land-holdings were the main ones who refused to participate in this task. The basic procedure for implementing this task is as follows: We explain that this is a spatial task and there is no right or wrong way to do it, only that we are interested in their responses. Farmers were given three plastic toy animals, a pig, a cow, and a horse. The farmer stands in front of a table and the three animals are placed in a row facing the same way. They are told to remember the direction of the animals and are given a period of time to memorize it. After they nod that they are ready for the next part, the animals are taken away and after a wait of at least a minute, the farmer is asked to turn around (180°) and place the animals in the same order and direction that they recall on the new table they are now facing. The farmers take the three figures and then place them on the table. If the toy animals are placed in the same direction relative to the farmers position at the first table (that is, for example if the animals were from her left to right in a particular order), then the informant is using a relative spatial orientation. If the farmer retains the original direction and order then it is an absolute orientation. Each farmer was asked to perform this task five times. Each informant conducted a trial run to ensure they understood the task and felt relatively comfortable with it. We discussed the task after they had completed it, again emphasizing that there was no right or wrong. After each trial we varied the order and direction of the animal task. Each of the five turns was recorded as absolute or relative and we kept track of the order as well, though this is not relevant for the analysis discussed below.

Many researcher interested in cognition and spatial orientation use the animal-in-a row task (Levinson, 2003; Bennardo, 2009; etc.). This was developed by CARG²⁷ in 1992. Thomas Widlock (2007) has written an excellent evaluation of the relationship between ethnographic research which investigates cognitive activities in common tasks, and experimental cognitive tasks which investigate those activities in “uncommon tasks.” What he wanted to do, particularly with the animals-in-a-row task was to evaluate whether the uncommon task results correlate with the way spatial reckoning is used *in vivo*. Widlock notes that “the ethnography of communicated common sense not only matches the statistical results gained through ‘uncommon’ tasks, it also provides an explanation for these results and is therefore preferable....the [statistical] results reflect the goal-oriented strategies adopted in common tasks, above all the common tasks of orienting oneself in space...”(ib. 2007: 274). This suggests that the results of the animals-in-a-row task (the “uncommon task”) should match with the ethnographic materials we have thus far

²⁷ CARG stands for the Cognitive Anthropology Research Group at the Max-Planck Institute for Psycholinguistics, Nijmegen, The Netherlands.

discussed. The two cognitive conceptual variables that are tested by this task are whether the subjects use an “egocentric” (i.e. relative) or “geocentric” (i.e., absolute) reference for sequencing the three animals when they are moved to the other table (Widlock, 2007: 274; Levinson, 1996).

Bennardo (2009) suggested that the relative method of orienting oneself is more “basic” and hence psychologically universal than the absolute method. The relative method is acquired very early in life and places the person’s perceptions at the orienting center. The absolute method is learned later and is used for “dead reckoning,” walking in a straight line, and navigating by stars or environmental cues. Psychologically, the absolute method for spatial reckoning reflects the idea of nature as all-encompassing and supports the biosphere and primary cause concepts yielded by our preliminary metaphor analysis. Using a relative method of orientation implies instead, the idea of a division, a separation from the surrounding by focusing on the self. From a preference for the relative orientation we can infer that a cultural model of nature would separate nature from humans: there is nature and there is us, we are distinct and independent of our environment. In our causal model of nature proposed above we have posited that Lithuanian farmers perceive themselves as “in” nature and that the relationship between humans and nature is analogous to part-whole relationships, in which the part is dependent on the whole but can also exploit or use the whole.

We are now in a position to present our results and interpret them. The results of our animals-in-a-row task are presented in Table 1 below.

Table 1: Results of the Animals-in-a-Row Task.

Cases N=44	relative	absolute
if 3 or more	15	29
if 4 or more	8	22
TOTAL	62	153

Using a simple T-test on the total results, the difference between relative and absolute scores was found to be significant at the $p < .001$ level. This statistical result supports our ethnographic inferences of Lithuanian farmers as thinking of themselves in and a part of nature.

These results would also give support to both our tentative cultural model of nature, our proposition that farmers have a relationship with their farmlands and perceive these farmlands as part of a larger complex (and animated) entity called “*gamta*.” This also supports the way farmers in general portray their attitudes towards nature as distinctive from the government. Both are external unstable forces that change, but the former is perceived positively, the farmer deals with it through knowledge and skills and is a part of the farmer’s “genuine culture;” the latter is perceived negatively and as part of the “spurious culture.”

6. Conclusion.

Cultural models are distributed collective cognitive structures that people use to understand and act in the world. Cultural models are not just summaries of collective knowledge, they are pragmatic and productive cognitive structures that not only people use to plan and shape behaviors, but which they presume that other people from their cultural community use as well (Kronenfeld, 2007; 2010). In other words, cultural models are important not just to know how people think, but also in anticipating and understanding what they do and are likely to do under

particular circumstances in the future. Thus, knowing the cultural models of the members of a community is of prime importance for policy makers, politicians and other relevant people.

From the free list and semi-structured long interviews we have posited two interrelated but distinctive cultural models. The first one is based on a national cultural historical developed conception of *gamta* as particular to Lithuanian people. There is a “Lithuanian *gamta*” that is conceptually distinct from say a Polish or Russian *gamta*. Few, if any North Americans would talk like this, particularly with what I can only regard as ordinary forest on flat lands about which there is nothing spectacular to my eye. Yet, one Lithuanian informant (not from this sample) once told me a story of being on a train in Sweden with other Lithuanians and, despite the awesomeness of the Swedish landscape, they pined for their Lithuanian landscape to such an extent that they started drawing it on the windows, and then they felt happy.

As Lithuanians themselves say, their identification with nature is sourced in their neo-pagan roots. Lithuanians are fond of saying that “if you scratch a Vilnius resident (Vilniečiu) you will find a peasant;” it may also be said that “if you scratch a Lithuanian atheist or Catholic, you will find a neo-pagan.”²⁴ This modernized version of the neo-pagan model of culture views culture as a place to rest, to revitalize the spirit. Nature is a nurturing pure biosphere in which the Lithuanian can feel like true Lithuanians. This model then is consciously rooted in a sense of cultural identity that is shared by almost all, if not all, Lithuanians. This, default and unmarked understanding of nature is only expressed in the second freelist question: “List everything that comes to your mind when you think about nature.” There terms such as “rest,” “peace,” “fresh air,” and “childhood” are cited frequently as are “trash” and “pollution.” But the latter two are the bad things people do to nature (though not the informants, as they let us know), the former are the qualities and effects of nature on the spirit of people. This cultural model is one held by Lithuanians in general and is the “unmarked” (in the marking hierarchy sense), default understanding of nature.

Lithuanian farmers do not use this cultural model of nature directly when speaking of their farmland, animals, or climate. For the farmers farmland, in contrast with “*gamta*,” is not a place of rest but of hard work, where they spent their days trying to produce healthy crops and animals. When farmers think of nature—here referring to the land, the crops they grow, and the animals they raise—they profess, in Sapir’s (1924) famous distinction a “genuine” rather than a “spurious” sense of connection to this type of labor—that is their labor is inherently meaningful to them. There is an affinity that creates what I have labeled (borrowing from Whitehouse and Lanham, 2014) a fused identity between the farmers and the nature represented by the natural conditions of their work (i.e., including the climate, soil, animals, types of crops, and pests). That is, the part-whole relationship, the sense of nature as a biosphere, of nature as provider and pure, and of (some) humans exploiting and doing bad to nature are all reproduced in the cultural talk about farming by the farmers. It is easy to refer to this relationship as one of struggle, because indeed it is dialectic, but it appears that farmers view the relationship more complexly, for they enjoy their work, it is the very difficulties and intellectual attention needed to be a successful farmer that weds them to their farm and the labor involved. While they do not find “rest,” they do find “meaning” and a sense of their own self identity as pragmatic, virtuous, hard-working humans useful to their family and country. Thus, nature provides them a sense of a genuine cultural identity. Underlying their conception of the nature they work with as farmers, then is also the “*gamta*” sense of nature as an intrinsic part of their personal and cultural identity. Thus,

²⁴ I have written somewhat extensively about the importance of neo-pagan roots in the construction of Lithuanian identity in the first preliminary proposal/report on this study.

farmers while acknowledging the use of pesticide and fertilizers, and “dungwash” which can pollute rivers and lakes, note that they are forced to do this otherwise nothing would grow. The basic ethos of stoic rationalism mentioned earlier informs their attitude toward the use of chemicals.

The commentary above and analysis above are preliminary, though I believe they are largely accurate. I would now like to end this discussion with a list of ten “deliverables” that should be considered by policy planners. Thereafter, I want to comment on how the findings here serve as a springboard for the second stage of the research which will focus on testing the results of the above analysis and confirming, refining, modifying or altering it. We need also to come to grips with the cognitive mechanisms that engage proposed aspects of the cultural models with present and future behaviors.

6.1. Deliverables.

I provide ten simple comments that should help policy makers understand farmer’s cultural models of farming (and nature) and how these affect how farmers have responded to policies in the past and how they will likely respond to new policies in the future.

1. Farmers are proud of and like their farm-work. They will respond favorably to policies that give them knowledge about how to predict weather better, how to obtain greater and sustainable crops, and they are accepting of new technologies.
2. Farmers work hard and are honest. Thus, any policy or framework that suggests otherwise is likely to be rejected by farmers.
3. Farmers do not enjoy exploiting the land, but feel forced to do so to make a profit, hence policies should keep in mind that their cultural models of farming are not purely driven by rational market forces alone but also by their cultural identity as farmers.
4. Farmers are likely to respond to ecological policies under three conditions: the policies are clear and pragmatic; the policies will not reduce their profit margins or ask them to make financial sacrifices; the policies involve minimal paper work.
5. Farmers need to have better communication amongst themselves. Not just associations for getting subsidies through government and EU programs, but for them to meet as members of a local farming association.
6. Networks of cooperation and communications should be developed preferably using the input of the farmers themselves.
7. Instabilities in prices for buying equipment or materials, and for selling farm products should be stabilized.
8. The main issue is that paperwork should be reduced.
9. All policies should be framed pragmatically so that farmers can integrate the policies into a cultural identity of themselves as farmers and not as accountants or enlisted men and women in bureaucratic programs.
10. Most farmers use a satisficing rather than maximizing economic model for farming.

6.2 Future Research Aims.

One of the main tasks for future research is to develop a consensus questionnaire based on the findings in this first research stage. Let us discuss three findings that are important. First, there

are two interrelated cultural models of nature, one is about *gamta*, the other is about farming. I have hypothesized that there is both a global and a local cultural model of identity. The first is related to a national cultural model and the second to a specifically farming cultural model of nature. We need to develop specific questions for interviews and hypotheses for how these two cultural models are related to each other.

Second, the cultural model of nature as approached in this research and for Lithuanians cannot be isolated from the farmers' cultural identity as farmers. I have posited that there is a "fused identity." I have also suggested that this fused identity is akin to that described by Whitehouse and Lanham (2014) regarding "modes of religiosity." Further I have connected this fused identity to Sapir's (old, but useful) notion of genuine versus spurious culture. We would need to test this theory using, in part, psychological tests similar to those conducted by Whitehouse and Lanham. Is the fused role identity that one takes on for specific contexts a dimensional or continuous variable or discrete? And would there be consensus (as hypothesized) that there is a fused cultural identity for Lithuanian farmers? A list of twenty or so multiple choice/true false questions could help in determining both if there is a consensus and/or if there is a continuum along some identity dimension from fused to donned/partial identity.

The animated, causal and balance aspects of the cultural model of nature needs to be worked out further. Do people see nature as animated and in what way is it animated? Questions about the animation of nature can be developed. The parameters of the causal relationship also needs to be worked out. Are the causal vectors only one way—from nature to humans? Or is there a causal vector of humans affecting nature? How is this latter vector recognized and made manifest? Such an investigation into vectors and directions of causality would impact on how farmers view climate change.

Farmers are making adaptations at the local level to identifiable patterns of climate change. Thus, there is an increase in pests, warmer even snowless winters, and more unpredictable weather. Farmers make adaptations to these variables in the weather, but seem not to see this as a global phenomenon. We need to understand the cognitive reasoning of local understandings as opposed to global understanding of climate change specifically. A series of questions regarding the global versus local shifts using similar content may help to gain insight into these two perhaps distinctive cognitive processes.

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It Was like Velvet: Cultural Nature in the Italian Alps (Dolomites)

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Presentation of the Fieldsite.

Vinigo is a mountain village with an elevation of 1,025 m (3,200 feet) situated in the Belluno province of the Veneto Region (Italy) (Figure 1).²⁸ It is one of the oldest settlements in the Ladin area (**Vinego Paes Laden**) in the Dolomites.²⁹ It is part of the area called “Cadore”, an historical region which borders Austria. The nearest town is Vodo, in the Boite Valley, which is also home to the municipality (Vodo, Peaio, Vinigo) (Figure 2).

The village is located between two creeks: the Rudan (to the West) and the Ruinian (to the East). In the past 3 windmills were located along the latter. Vinighesi (as local people are called) say that Rudan (**ru**=creek) means “*torrentel'fa danno*” ‘creek/makes damage,’ while Ruinian means “*torrentel'fa rumore, e non fa danno*” ‘creek/makes noise, and not damage.’ Even the most recent event of a **roa** ‘landslide’ in the area (August 2015) caused by heavy rain, has provided evidence that this seems to be the case. The Rudan is a tributary of the Boite, a right tributary of the Piave,³⁰ a river that flows entirely in the Veneto Region and is one of the most artificial waterways in Europe (creeks and rivers harnessed, artificial lakes, dams). Both creeks originate in the Antelao (the second highest peak in the Dolomites, 3,234 m), which is located to the north of the village. The other imposing mountain (to the west) is the Pelmo, 3,168 m, locally named **el caregon del Padreterno** ‘the throne of God.’ Both mountains are very relevant to the life of the people of Vinigo and in their daily talk they often make reference to them. To the south lies Mt. Rite (2,160 m). and to the east Col Maò (1,470 m).

Vinigo is connected to the rest of Cadore by a paved road with a steep slope and sharp turns which joins the *strada statale* ‘state road’ 51 of Alemagna (SS51) at Peaio (Figure 2). One of our interviewers recalled when in the past people from Vinigo would be preparing to get off the bus in Peaio and the bus driver would announce in an ironic way: “For Vinigo, you change here: Eagle service.” In time of heavy snow the road is closed as was the case for the snow storm at the end of January/early February 2014. The village remained isolated, cut off from electricity for 48 hours, cell phones became useless, and the road from Peaio to Vinigo was closed.

The relationship between Vinigo and Vodo has not been an easy one. To stress this tension our interlocutors often made reference to the nicknames used to refer to the inhabitants of each village of the area. Vinighesi are called “**i cian de Vinigo**” ‘dogs from Vinigo.’ Local people explain that it refers to the high altitude of Vinigo and the role of guardians of the territory historically played by its inhabitants. Vodesi are instead called “cats” (De Ghetto, 2009: 48).

In the first half of the XX century Vinigo was entirely surrounded by cultivated fields: wheat, rye, corn, potatoes, barley, and hemp. Old pictures show a cultivated landscape. Then meadows took over in order to produce hay to feed the cattle. Nowadays no local family raises cows nor pigs and fields are fallow. “Everyone had animals: cows, goats and also pigs” recalls

²⁸ In Italy, the Region is the main administrative subdivision followed by provinces, which have been emptied of powers in the recent administrative reform (Delrio law, 7 April 2014).

²⁹ The Dolomites mountain region was declared a Unesco World Site in 2009, when nine areas have been designated as a “Serial Heritage Site.” Among them the Pelmo-Croda da Lago System. “The nine components of The Dolomites World Heritage property protect a series of highly distinctive mountain landscapes that are of exceptional natural beauty.” (<http://whc.unesco.org/en/list/1237>).

³⁰ It must also be mentioned the very important role played by the river during World War I.

Riccarda. And Mario adds: that few families, “the more wealthy ones,” also had one or two horses. As Dario says: "*Stalla e bosco*" ‘stable and woods’, from these two sources came what you needed to survive. As the *bosco* ‘woodland’ is no longer maintained and used for woodcutting, it is expanding and encroaching the village. Retreating glaciers are also participating in creating an unfamiliar landscape in the area.



Figure 1: The Fieldsite: Vinigo, in the Veneto Dolomites.

Until the 60s/70s Vinighesi derived their main source of livelihood from agriculture, breeding and timber. Itinerant activities such as *calderai* ‘coppersmiths’ and *vetrai* ‘glass-makers’ were added as an essential source of income. The village has felt the dramatic impact of different waves of emigration in the 1900s. In some cases they were seasonal movements, in others (particularly between the two World Wars) migration was definitive and permanent (e.g. to USA, Argentina). People also emigrated to Germany, Holland and the former Czechoslovakia to be ice cream makers. They always make a point in stressing that they left to be *gelatieri* ‘ice cream makers’ and not *gelatai* ‘ice cream sellers.’

Vinighesi of a certain age remember the *Colonie di Vacanza* ‘Holiday Camps’ that animated the village in the summer time during the fifties and early sixties. For example, la Locanda dal Gobbo, the inn which Emma Pivrotto opened in 1957 and was in business for almost thirty years, rented rooms in different houses of Vinigo in order to host the guests. As Riccarda, Emma’s daughter, recalls: “Parents came to visit their children and then they used to come back bringing their friends.” People have very fond memories of the period of the *Colonie*. The arrival of young people, often from the cities, animated the life of the village during the summer; it allowed to make new acquaintances, which sometimes turned into long-lasting friendships, to find out about things and practices of the city, and for families to get some revenues. People remember when during those summers their parents made them and their siblings give up their bedrooms in order to use it to host guests. Ettore, in his mid-seventies, adds that for *ferragosto* ‘August 15’ even the barns were used to accommodate guests. Angelina, his wife, although ten years younger, has a vivid memory of those times, and explains that she moved to the *mansard* ‘attic.’

When *occhialerie* ‘lenses manufacturers’ opened in the area in the late 1960s, these factories attracted many people from Vinigo providing a major source of income for many families. To get a better understanding of the importance of this industry, one needs to be reminded that 80%

of the glasses made in Italy are produced in Cadore. Yet the depopulation has continued; today the village has only 115 inhabitants (58 males and 57 females) compared to 359 in 1929; and during winter time they are down to less than 100 residents. Some houses are abandoned, some have become *seconde case* ‘vacation homes.’ The archival data kept in the town hall show that in the early 1900s, Vinigo had 177 heads of families. Considering that the average family was made up of 4/5 people, one can get an idea of the strong impact of the current depopulation.

The last groceries store closed its doors in December 2013. In the past, there were 5 *osterie* ‘family restaurant’ and a restaurant. Today none survive. One element stressed by several interviewees as characterizing the Cadore, is that in the past both boys and girls went to primary school. “The school in Cadore was ahead of the school of the plain” says Enrica, born in the early fifties. A consideration backed by historical studies (Piseri, 2012: 55).



Figure 2: Vodo (Municipality) and Peaio (route SS51) and the village of Vinigo

Mapping the Village of Vinigo.

The village has a circular shape. The central area of the village—locally called “Pias”—is traditionally dedicated to privately owned allotments for the cultivation of **capuze** ‘cabbage,’ a variety of very fine cabbage which is considered the most prestigious produce of the village. Today also vegetables are grown in these allotments. No development project has been allowed in this area. A Vinighese told us that the presence of small plots and thus of many small owners (some of them living abroad) and the high quality of the land have helped to maintain the historical intended use ‘*destinazione d’uso*’ of this land in the center of the village.

Two streets encompass the central area forming a kind of oval. Locally one street (via Savilla) is considered ‘the front’ “**via par davante**” and one (via della Grotta and part of via Festin) ‘the back’ “**via par daos.**” The more formal side of the village (the front) is where the Church of San Giovanni Battista (the oldest part goes back to 1506), and the former primary school (today home of the local group of the Associazione Nazionale Alpini) are located. The back—the more informal side—is where the Latteria Sociale ‘Communal Dairy’ used to be (the building still stands but the Dairy closed in the mid 70s (see Figure 3, 4 and 5).



Figure 3: Stamp of the Communal Dairy (from letterhead).

These distinctions are locally drawn. As one of our interviewees in her 60s told us, in order to take the front side one should be properly dressed. Most people still adhere to this. A third street (via Pias) cuts through the village “*via par mezo*.” At the northern edge of the village the path to Greanes starts, a locality used in the past by Vinighesi for pasture.



Figure 4: Communal Dairy, February 2014 (Photo © A. Paini).



Figure 5: Communal Dairy after being cleaned by a small group of Vinighesi and reopened for a communal evening occasion, November 2014 (Photo © A. Paini).

Space is an important and multifaceted dimension in Vinigo. If some interlocutors recognized a “front” and a “back” side, which follows a north/south axes, all the old inhabitants of Vinigo acknowledge another distinction, which follows a different criterion: the low half vs the high half of the village. People remember a strong sense of belonging to either Savilla (high) or Festin (low) as well as (in the past) the local rivalry. Today this distinction is less marked and people tend to recall more the sense of belonging than one of competitiveness. As one can see from Figure 6, this distinction is expressed through a dotted line which follows an east-west axis and which splits the village in two halves. The line divides Savilla from Festin: The Church of Saint John is located in the Festin half, whereas the Chapel of Saint Lorenzo in the Savilla half. Another line indicates the road descending to Peaio.

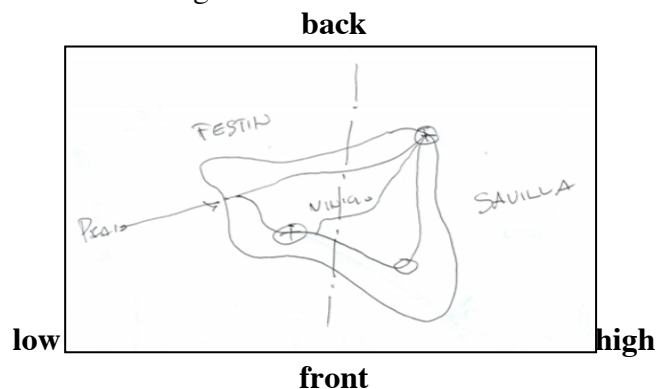


Figure 6: Drawing of the lower/upper area of the village, made by an interlocutor.

A social institution that cuts across this distinction is “*coscritti*” ‘a kind of age class;’ young people, men and women, born in the same year or in nearby years. On the façade of a wooden building in via della Grotta, a prominent white graffiti “1950 51 52” written in the 1970s by the *coscritti* of the year 1951 has not been removed. It stands as a ‘traditional’ graffiti (see Figure 7). Seven people (men and women) of this age group still live in Vinigo (one of them only part of the year) and often emphasize this sense of belonging: they still engage in communal activities. It was their idea to clean the inside of the Communal Dairy in the spring/summer of 2014 as a part of a project for a new cultural association.



Figure 7: Via alla Grotta, Graffiti, January 2014 (Photo © A. Paini).

Most of the houses have at least a small fenced garden (locally called *orto* or **al brolo**), where carrots, celery, beetroot, garlic, onion, and lettuce are grown. Sometimes there are also fruit trees. The allotments in the Pias are instead called **cianpo**. This central area, which comprises allotments dedicated to the cultivation of **capuze** ‘cabbage’ for which Vinigo is well known, has remained unchanged for generations. The cultivation of this cabbage is unusual in that the gardens, located at the center of the village, form a single large field divided into many small sections each one owned by a different local family. All Vinighesi stress that “it was a piece of land suitable for that kind of work.” We have questioned them in order to understand what it means “being suitable.” Some of them speak of the soil which has good nutrients and the right amount of water and it is at the right altitude; others refer to the fact that wild animals love cabbage, so in the past it was a way to protect the produce from being eaten by animals, as one among them puts it: “**l’è l’altitudine, l’è la terra e l’è la conca, se vede che l’è protetta**” ‘it is the altitude, it is the soil, it is the gully, one can see that it is protected’ (Gianna).

In the past, Vinighesi kept **capuze** they cultivated in the Pias for consuming at home and exchanged some of them with people from other communities. Today, some sell **capuze**, others donate them to friends. As one of our female interlocutor told us, they are “*troppo preziosi*” ‘too precious’ to be sold. In more recent time, due to different climatic conditions, a variety of new cultivations have been introduced. From the interviews both elements of continuity and discontinuity emerge. In fact some of the women interviewed, when asked how they choose what and where to plant in the **cianpo**, speak of a continuity with the choices made by the women who planted crops in the **cianpo** before them (usually mothers, grand-mothers) in terms of a form of ‘respect’ (“*rispetto*”) towards those women.

Land Use Management.

“If there were no *Regole*, the environment in Cadore would have been devastated” (MDB).

A very important local institution in the Dolomites region is *La Regola* ‘The Rule.’ It is a traditional communal way of ruling the community life and managing land, woodland, and resources which goes back to the XIII and XIV centuries. The ‘communal properties’ through the centuries have become a residual phenomenon (Lorenzi and Borrini-Feyerabend, 2009), all of which makes the land use management in the Dolomites even more unique. As *terre civiche* ‘civic lands’ they are characterized by being *inalienabile*, indivisible, *inusucapibile* ‘non-usucaption,’ *inespropriabile* ‘cannot be confiscated’ and by the immutability of their agro-forestry destination.

La “*Regola Grande*” ‘The Big Rule’ includes Vinigo, Peaio, Vodo e Cancia; its first **laudo** ‘common written charter’ goes back to 1289. At that time Vinigo was part of the Centenaro of Venas, one of the ten constituencies that made up the *Magnifica Comunità* ‘Magnificent Community’ of Cadore. The new Napoleonic municipalities were grafted on to these old constituencies. The *Regole* have been revived as well as the Magnificent Community in the XX century, and today Vinigo with Vodo and Peaio form the *Regola Grande*. They were able to get back 95% of their land (5% remains with the municipality). There is also the *Regola Staccata* ‘The Detached Rule,’ to which belong the families from Vodo. In the past also a *Regola Piccola* ‘Small Rule,’ which included Vinigo and Peaio, was functioning, but later it dissolved (Belli, 2007: 21). Woodland around the village became private property and none of the inhabitants is able to remember when this reorganization of land management took place.

Regolieri ‘members of the Regole’ used to be all males. Nowadays, in the case of no male descents, also a woman descending from a *regolieri* family and if married to a *regoliere* can become a member according to the *Regole Ampezzane* ‘Rules of Ampezzo.’ Another proposal under discussion at the *Magnifica Regola Grande dei Monti di Vodo* ‘Magnificent Great Rule of Vodo Mountains’ is that a woman can become/maintain her role as *regoliere* even if married, and if she undertakes to transmit to her son her family name (Mario Della Bona [MDB], 29 January 2014). In any case, a *regoliere* must descend from one of the ancient families or one that has been living in the area for at least 100 years.

An example of the importance of the *Regole* and of what the *regolieri* can achieve can be seen in the Pelmo having no sky slopes. They opposed any development projects of this type on the mountain. While the Vinighesi speak with respect of the *Regole*, they also stress that they have no confidence in the State. Thus, confidence in local traditional *Regole* is counter posed to mistrust in wider forms of government.

Family Names.

Four historical family names are found among Vinigo inhabitants: De Lorenzo, Della Bona, Marchioni, and Piviroto. These are matched by nicknames: an individual named De Lorenzo “Tomea” belongs to a different family subgroup from an individual named De Lorenzo “Frates” or De Lorenzo “Nanete” or “Fortunes.” Local people often name other Vinighesi by their family nickname: for example, “**ie de chi dei Veci**” ‘they are from the Veci subgroup,’ referring to a family among those carrying the Piviroto last name. These differences are often found in the *foglio di famiglia* ‘family sheet’ of the *Registro di Popolazione 1896-1902* ‘Register of the

Population 1896-1902' concerning the village of Vinigo. I consulted these documents in the Registry Office at the Town Hall of Vodo; e.g. Maria Marchioni (1857-1904) widow of De Lorenzo Flaminio "Medego" (sheet 30) or Giuseppe de Lorenzo "Tomea," unmarried (sheet 51).

Climate and Environmental Changes.

Phenomena related to climate and environmental changes affect the Dolomites in general. The perception of global warming is an experience shared by the inhabitants of these areas. For all of them the memory of past very cold and snowy winters is quite vivid. Their family memories highlight the changes taking place. They remember that during early years of the last century some *frazioni* 'hamlets' experienced true isolation, that is, they were often blocked by layers of snow several meters high, sometimes even for weeks. The local highest mountain, the Antelao, used to have three glaciers. The upper and the lower are in regression, while the third one has disappeared. The other mountain, the Pelmo, had a *nevaio* 'permanent snow field,' which is no longer there.

At this altitude (over 1000 m.), the increased temperature has had paradoxically also 'positive' effects on agriculture: new cultivations—definitely not alpine—like tomatoes are now possible in the most sunny areas. On the other hand, the increasing wild woodland (no longer cultivated) is changing the micro-climate and raising the level of humidity. This is making wild animals (mainly deer) come closer to the village (in Vinigo also getting into the central Pias at night searching for food). Fencing individual parcels of the Pias is a very recent practice to which the Vinighesi resort hoping to protect their crops from deer.

Methodology.

Focusing on the relationship between local knowledge and climate change, the data were collected by Elisa Bellato and myself during our fieldwork in Vinigo between October 2013 and July 2015 for a total of 7 weeks.³¹ Our visits were planned on 'the cabbage calendar,' that is, on the main activities connected to the *cavolo cappuccio* 'cabbage,' bearing in mind that the seed for the cabbage is prepared in autumn, sown in spring (April-May) close to home, planted in the Pias around St. John's Day (June 24)—the patron saint of the village—and collected and stored in early November (see Figures 8). We also spent a couple of weeks in Vinigo during winter time (January-February 2014) in order to get a better understanding of daily life in the village. Because of the snow storm that struck Vinigo at that time, we were isolated from other communities for a couple of days and this allowed us to acquire a more in-depth perception of what local people mean when they speak of feeling/being isolated, while at the same time it allowed local inhabitants to become more familiar with us (Bennardo & De Munck 2014: 60-61).

³¹ Periods of fieldwork: 30 October-4 November 2013; 28 January-11 February 2014; 19 May- 22 May; 27 June- 5 July; 28 October-3 November; 30 June – 5 July 2015.



Figure 8: Cabbages ready to harvest and to be stored, November 2, 2013, (Photo © A. Painsi).

During the various visits we used the following data collection strategies: Participant observation, informal conversations, nature walks, free listing tasks, space task and open and semi-structured interviews. As Bennardo and De Munch have argued (2014: 57-58), the qualitative versus quantitative typology does not correspond to the complexity of this type of research: data are “hybrid.”

The interviews were structured around a series of questions (in Italian, see Appendix) that we considered culturally appropriate/relevant, developed around six main areas, taking as a starting point the list of questions agreed upon with the other research units. The free listing tasks (30) and the semi-structured interviews (14) were recorded and later transcribed by Iolanda Da Deppo, a local assistant from Domegge di Cadore, as we asked people to speak/respond as much as possible in their Ladin language.

Data Collected and Results of Analyses.

Space Task.

Our sample consisted of 28 participants from the local community (15 men and 13 women from different age groups and with different education background). The sample was divided in three age groups: 18-42, 43-65, 66+. The largest group was the age group 66+. Vinigo is a very small community with an old population and this justifies the unevenness of the age groups. We administered the task either at participants’ place or at the place where we were staying in Vinigo.

The three farm animals we chose for the task were: a cow, a horse and a goat. Each participant was asked to stand (or seat in the case of elderly) in front of a table. S/he was shown the three small plastic farm animals standing in a row, all facing the same direction. Then the participant was asked to memorize the animals’ display. When s/he was ready, one of us removed the animals and started some conversation. After a minute s/he was given the three animals and asked to dispose them as s/he remembered them. Each trial had been carefully planned in advance and trials were randomized. The subject’s choices of sequence and direction for the animals were recorded. The trial was repeated five times for each participants, obtaining a total of 140 responses (28 x 5).

We decided not to use the word ‘memorize’ with the participants as we realized some of them (especially the elderly) were oversensitive to the issue. Instead it was asked to ‘remember’ and then to ‘recall’ what they had observed. Two pictures of the Animals-in-a-Row task were taken for each trial (before and after rotation).

Results of Space Task.

The results (see Table 1) for all the trials (28 x 5) are: Abs 79/56.43% and Rel 61/43.57%. A low preference for Abs FoR is detected. Once we code the subjects as absolute or relative coders if s/he used three or more times the same FoR (cut-off point 3, see Table 2), we observe some changes. In fact, our sample resulted in 17/61% Abs FoR and 11/39% Rel FoR coders. The preference for the Abs FoR increases from 56% to 61%. No Abs FoR coders were found in the younger group.

Table 1: Overview of the Sample.

	18-42 years	43-66 years	66+ years	total
women	2Rel	5/4Abs + 1Rel	6Abs	13
men	2Rel	5/4Abs + 1Rel	8/ 4Abs + 4Rel	15
total	4Rel	10/8Abs + 2Rel	14/10Abs + 4Rel	28/18A+10R

Breaking down the results of the sample by gender, we observe 7 Abs FoR and 8 Rel FoR coders for men and 10 Abs FoR and 3 Rel FoR coders for women. All women in the last age group (66+) were Abs FoR coders, whereas the 8 men of the same age group were equally divided between Abs FoR and Rel FoR coders. We detected no difference among the second age group, both men and women had the same result: 4 Abs FoR and 4 Rel FoR coders. Women score higher than men on Abs FoR responses at cut-off point 4 and 5.³² So overall women prefer to use the Abs FoR more than men (see Figure 9).

Table 2: Results with the Cut-off Point at 3 and at 4 for Subjects.

Cut-off Point	Absolute	Relative	Total
3	17 (60.8%)	11 (39.2%)	28
4	9 (64.3%)	5 (35.7%)	14

³² After moving up the cut-off point to 4, the general results increases further (from 61% to 64%) in favor of the Absolute FoR (see Table 2).

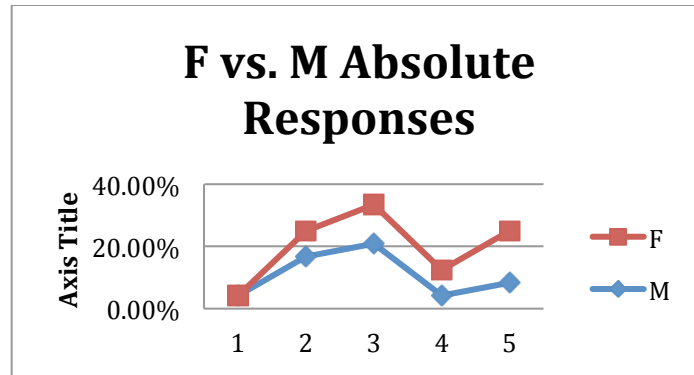


Figure 9: Female vs Male Absolute Responses.

Three Different Spatial Strategies at Work.

The analysis of the space task allows to point out different spatial strategies at work, depending on the participant. The three strategies we observed are:

- 1) Strategy for direction;
- 2) Strategy for animal sequence;
- 3) What we are calling “Same Direction” (SD).



Figure 10: Space Task: Trail 2/5: Before (2A) and After (2B) the Rotation, 2 July 2014 (Photo © A. Paini).

I placed the three animals in a row (see Figure 10, left) and asked Bruna (75 years old) to stand in front of the table; then she rotated 180° degree and placed the three animals on the opposite surface (see Figure 10, right). Bruna’s responses were: 3/5 Abs FoR and 2/5 Rel FoR. She coded in terms of fixed directions, like North and South, as well as in terms of bodily position like left and right (see Levinson 1997). The sequence in the photos (2/5) shows the three strategies at work. The 2nd trail is Rel FoR. The animal sequence has remained unchanged (cow-goat-horse); the direction has instead changed: animals were standing facing west (left, 2A) and have then been disposed by Bruna facing east (right, 2B). Here we observe also the SD strategy at work. The animals occupy the ‘same direction’ before and after. If Bruna had chosen Rel FoR *tout court*, the animals would stand facing east, but the sequence would have been horse-goat-cow. Thus, Bruna has relied on more than one strategies in order to accomplish the task. She has actively used both Abs FoR and Rel FoR as well as introducing a third strategy, that is SD.

The photo sequence of the 5 trials (2x5) proved to be a helpful tool in the process of analyzing the data. 11 participants chose this third strategy (SD): 6 men and 5 women. Four men whom had been coded with a preference for Abs FoR (3/5) used it, and 2 men with a preference for Rel FoR; 3 women used it with a preference for the Abs FoR (3/5) and 2 with a preference

for Rel FoR. It would seem that the only choice they made is the first choice and that the stimulus they received later did not play a part in their subsequent choices.

Free-Listing Task.

The free-listing task based on six categories—*piante* ‘plants,’ *animali* ‘animals,’ *territorio* ‘physical environment,’ *tempo atmosferico* ‘weather,’ *persone* ‘people,’ *esseri fantastici* ‘supernatural’—was administered to 30 subjects. The last category proved to be the most difficult to elicit. The two longer set/list of terms elicited were those concerning plants and animals. These data is currently under analysis.

Under ‘animals’ our participants inserted wild animals, domestic animals, quadrupeds and bipeds, birds, reptiles, and one respondent a fish. Under ‘plants’ they included wild plants, domestic plants, edible plants, fruit trees, and flowers. During our first visit we used the category *supernaturale* ‘supernatural’ but we soon realized it did not generate any result. We tried with *esseri fantastici* ‘supernatural beings’ and, although we were not completely satisfied with it, we realized it proved a more conducive way to put the question. In general, women seemed more patient than men in listing the different items. The men would mention a few items and then start to narrate event connected to one of many of those items.

If the space task showed that women preferred an Abs FoR, the free-listing task allows to make the point that they have maintained a deep local knowledge. Gianna in her late sixties recalled 46 names of plants and 51 of animals; Fanny (75 years old) mentioned 22 plants and 25 animals; Lino instead 17 plants and 19 animals, Dario 10 plants and 19 animals, although Artelio, born as Gianna in the 1940s, was able to name 26 plants and 42 animals. In the presence of migratory (seasonal or definitive) movements involving mainly men, women had more experience with the local environment. They had to carry out all the work.

Interviews: “It Was like Velvet.”

We conducted and recorded 14 semi-structured interviews (7 men and 7 women); we also had many other informal conversations while in Vinigo. During the interview our interlocutors often switched back and forth from Ladin to Italian. The interviews were transcribed after each period of fieldwork so that we could rely on them for the next research period.

I consider different interaction and relationship of our interlocutors with their environment. I first examine ideas about **climate and environmental changes** through a choice of relevant passages of the collected transcribed material. **How do the people of Vinigo perceive them?** Then, **I look at how they understand/interpret the perceived changes.** Further, I present a number of relationships that can be inferred from these passages.

In presenting their idea of ‘nature,’ our interlocutors foreground the changes that have taken place in the environment close to themselves. They first state that snow, ice, and glaciers are not part of the yearly landscape as it was in the past. They also point out that fields around the villages are no longer cultivated. Then, they affirm that woodland, although it has always been part of the landscape, is today taking a more prominent position. So their first responses point to some components of their environment which withdraw or disappear and then to others which are now taking a more front-stage place.

Lino, a man in his 60s who has spent most of his life living in Vinigo, expresses his concern for the changes affecting the local environment in these terms: “Certainly the temperature has increased. The glaciers that I used to know are there no more. And ... not even the year-round

fields. For example, the lower glacier on the Antelao now is all gravel; there is no longer a permanent snow field on the Pelmo.”

Most of our interlocutors refer to the time when fields around the villages were cultivated and those further away were used for feeding the animals. And, when asked, they refer to these different parts of land outside the village using different specific local names (**pràs, vares, bosche**). Most of these elements of the environment have disappeared. When Vinighesi recall the different names used for the land, they also recall stories associated with those places. Some of them appear to be more dense than others because richer in memories. The environment has changed and along with this all the stories associated with hard working sharing and sociality. Marilena, a woman in her fifties, with a university degree, who also has chosen to live in the village, points to that difference when she says that “The hay has a memory for me that the lawn does not.” She explains that it was her mother who carried the hay “because for my mom going back and forth from the barn to the lawn with the sled was something she took in her stride.”

While noticing elements lacking in their environment, at the same time they highlight new ones that have appeared. Marilena adds: “Compared with the past, the woodland has been allowed to encroach into the field. It would have been better if this had not been allowed to happen, unfortunately, however, it has an air of abandonment about it.” The idea of an environment which has not been taken care of, which has been “abandoned,” “neglected” emerges in other interviews, and I will return to it. The presence of deer is another notable new feature of the local environment, which many refer to (see Figure 11). To mention but one: “Deer have hunted roes because deer also inhabit the dense forest, while roes need clearings to live. And there are few clearings today, because the woods have become so thick” (Riccarda, a woman in her sixties).



Figure 11: Vinigo after the snow storm:
Footprints, animal tracks, and tire tracks, February 10, 2014 (Photo © A. Paini).

So the woodland is encroaching while at the same time it is becoming more dense, two important changes due to the fact that the land is no longer cultivated. However, Lino remarks that among the conifers, the *larice* ‘larch’ is disappearing. Lino is stressing that although the woodland is expanding and becoming more dense, some traditional salient species such as the larch are disappearing, and he is convinced that the *Forestale* ‘Forest Rangers,’ the authority in charge of giving permission to cut down trees, is not taking this change seriously.

Besides the encroaching of the woods, people mention other changes connected to the loss of agricultural land. Ettore, for example, refers to part of the woods that he inherited from his father, but its location has been lost. He explains: “When you were cutting the grass you also

knew where the boundaries were, now we no longer know where the boundaries are.” Marilena, although younger than Ettore, makes a similar remark: “In the past the boundaries between fields, you could see them, really you could see them.” So the alteration in the environment has brought along also an alteration in the ability to recall, the knowledge of boundaries is lost.

Weather is another component to which Vinighesi refer to in talking about changes in the environment. For some of them, in the past it snowed more often whereas today it rains more often. Weather is considered more unpredictable compared to the past (*le stravaganze del tempo* ‘the vagaries of the weather’, Gianpietro). However, some of the elderly men recalling Christmas’ Eve of 1940 when a fire destroyed a section of Vinigo burning to the ground many timber houses, underline that it was a snowless Christmas, which made it more difficult to contain the fire. To them the weather has always been unpredictable.

Local Interpretation of Climate/Environmental Change.

I will now attempt to consider how people explain these changes. For some, the weather is the king, whereas for others it is human activity which is all important. A human intervention which does not speak the language of domination but that of care, taking care of the woodland. Still for others these two rationales combine (Strauss, 1999) as Rino’s comments suggest: “Everything depends on the weather. *“Il tempo è quello che comanda tutto”* ‘the weather is what rules everything.’ In the past there was sun, a lot more than today. Now in the same day the weather changes one thousand times... because the weather has changed.”

He then goes on to remark: “The bark or the cones, the dry ones, were burned, and some branches as well, if we were allowed to collect some wood, because in the past the woodland was treated like a kitchen. It was really clean, now one cannot even walk because now it is a disaster, but at one time it was taken care of with respect, those who were cutting firewood were cleaning up after themselves.” Rino, a Vinighese in his sixties, which has worked most of his life outside the village, but has always kept his home in the village, points out the concerns that emerge from many of the interviews, that is, the ‘neglect’ in which the woodlands are left today.

I am struck by the passage “In the past the woodland was treated like a kitchen,” as Rino connects the woodland, an open space, with a kitchen, a domestic space. My interpretation of this image, given the context in which it is advanced, is that the kitchen refers both to a place kept clean and where nothing went to waste. A place which required to be looked after. In the past in many homes it was the only room kept warm during the cold season, thus, a place inhabited/lived in by people. It can also refer to the fact that in the past the woods were less thick and one could find clearings in the woodland.

The sense of a place well-kept looms large. Gianna for example is quite explicit about it: “The fields were spectacular. Flowers everywhere. The flowers disappeared when they stopped cutting the grass. In some places where they started cutting again, the flowers came back.” If some components are not present anymore in the environment, nevertheless their disappearance is considered reversible; it is not an absence without the possibility of a coming back. And in both cases, it is human intervention (‘when **they** stopped cutting the grass’ and ‘when **they** started cutting again’) which is responsible for it. The sense of a place well-kept, clean, is associated with the idea of “spectacular” fields.

Questions that have been central to this research are how do Vinighesi perceive the features of their environment? Do they attribute them intentionality? Some as Marilena (her comment came from a telephone call after a landslide affected a lower nearby village in the summer 2015),

seem to attribute the quality of agent to elements of the close environment: “That is how things are, this year the Antelao [the mountain] wanted to move around.” Others prefer to stress interactions with the environment. Lino: “When I go for a walk..., I come and go, and a year later I pass the same place I was before. If I go to Milan, no ... a street, a house does nothing for me, but in the woods I remember, a plant, a stone, the root of a tree.”

As Tim Ingold underscores: “ways of acting in the environment are also ways of perceiving it” (2000: 9). Two perspectives connected to humans and their relationship with the woodland emerge: 1) one should read the woodland, and 2) to act on it appropriately. Our interviewees associated two different types of needs/skills: one needs to have knowledge about the woodland, but one must also have the capacity to listen to it. Lino emphasized that: “A woodland is like a book, is a book ... it says it all. The important thing is to read it. But clearly before reading it, you need to know how to read it. And take the time to read it.” And explains that you need to have ‘passion’ for this.

Some of our interlocutors seem to stress an “earpoint” more than a “viewpoint” (Feld, 1996: 95). Lino underscores that: ‘If I am in the middle of the woods, I sense the air, the smell of things, I feel ... I feel at home’ “*se io sono in mezzo al bosco sento l’aria, il profumo delle cose, sento ... mi sento a casa.*” And again : ‘**Everyone rushes. Everyone hurries.** In the woods you walk slowly, you stop, you sniff the air, and you take it in...’ ‘***Dute i camina de corsa, dute i core. Nel bosco si cammina piano, ci si ferma, si annusa l’aria, si sente ...***” Thus there is a way of acting in the environment that requires a specific posture. Yet to act rightly also implies the possibility to act wrongly. Flavio during the first nature walk clearly stated that: ‘A woodland must be cleaned up; otherwise the following year there will be no firewood.’ This comment seems to point to a kind of reciprocity between elements of the environment and humans. Everyone agrees that in the past the woods had a very rich “*sottobosco*” (undergrowth), e.g., a high production of blueberries, which today is gone. Whatever is left is considered of a lesser quality. Mushrooms, for example, are less tasty than what they used to be.

We should remember that as Sara points out “to collect firewood everyone has his/her own places, because everyone has their own property, and you can’t go into other people’s property.” Vinigo woodland, which used to belong to the Regola Piccola—thus, common property—has been transformed into private properties. Humans must tend to the woodland to keep it healthy, and a healthy woodland benefits humans. Otherwise, as Maria states: ‘The woodland will take over, ‘it ‘eats’ everything’ “*Il bosco si ‘mangia’ tutto,*” a concern which reveals also some kind of anxieties about the future.

I want to leave the last word to Gianna; speaking in Laden about what she considers a dramatic alteration that has affected the close environment, she brings out memories of when she was young and the fields were well groomed: ‘Everything was well-kept, the woodlands were well-kept. We, the children, went around in our home-made soft-soled shoes.’ “**era duto bel neto, era i bosche nete . nos autre riedes deane co i scarpete fate in cèsa e basta.**” And adds: ‘The grasslands were like velvet’ “**i pra i era come al veludo.**” Another strong image, that points to a tactile sensation in perceiving the environment by associating the land to the feel of a fine textile. The environment of the past brings back memories of long hours of hard work for the women and for the men though mitigated by images of softness, care, good tastes, closeness, and solidarity among people. The memories of a strong interaction with the environment loom large.

Hypothesized Cultural Model of Nature.

From the examples presented a number of relationships can be inferred that are parts of a Cultural Model of Nature:

- a *reciprocal* relationship between humans and woodlands;
- a *reciprocal* relationship between woodlands and wild animals (e.g., increasing woodland leads to increasing presence of deer);
- an *asymmetrical* relationship between weather and human activities (e.g., the weather influence agricultural produce such as cabbage's growth, whereas humans do not influence weather);
- supernatural entities can master physical environment (e.g., it [God?] stopped a landslide).

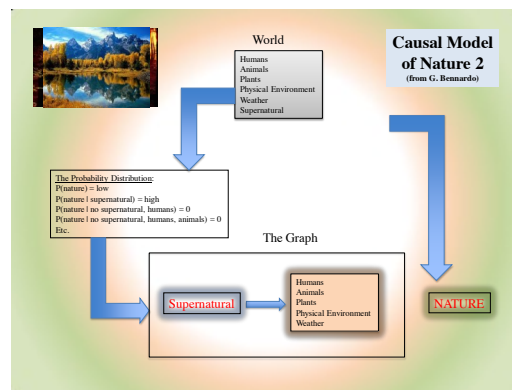


Figure 12: Causal Model of Nature 2 (from Bennardo 2014)

It appears that this Cultural Model includes 'Causal Model of Nature 2' (see Figure 12). It is difficult to locate the place that animals have in this causal model. Subjects didn't talk much about animals; places were more salient. Not only today families no longer have active stables but our interlocutors, when asked about the activities connected to taking the animals to the higher fields in the past, focused more around moments of sociality with the elderly or with peers or around the heavy work required in collecting hay (to feed the animals once they were taken back in the village) than about narratives centered on the animals. Further investigation will look more into this issue.

When one focuses on giving and receiving, would the notion of reciprocity fit the way Vinighesi think about these interactions? What does it mean "to take care of the land"? What do they mean when they say that "humans and land are connected"? It is possible that they mean that when humans are in a closer relation with soil and plants, then the woodland and the plants give back.

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APPENDIX

INTERVIEW QUESTIONS

1) LAVORO AGROSILVOPASTORALE

- 1) Fai qualche lavoro legato alla terra o al bosco?
 - 2) Ci racconti queste attività
 - 3) Quando sei impegnato con queste attività? (stagionali, annuali, continuative, saltuarie ecc.)
 - 4) Ci racconti cosa hai fatto ieri (questa settimana)?
 - 5) Ci sono delle attività che si fanno solo in un certo momento della giornata o della notte? (ad es. nel passato si falciava l'erba al mattino presto per via della rugiada che la rendeva più tenera; oppure certe attività legate all'orto)
 - 6) Ci sono modalità di lavoro e tempi che sono specifici di questo paese? (es. cavolo)
- * lavoro legato alla terra (attività principale-secondaria-saltuaria)

2) COMPETENZE NEL LAVORO

- 1) Quali ritieni siano conoscenze essenziali per ottenere dei risultati positivi/buoni nel tuo lavoro? (es. nell'orto seguire ciò che fanno gli altri)
- 2) Cosa consideri "attività produttive" legate alla terra? (es. raccolta mirtili o prodotti del sottobosco; rispetto all'orto)
- 3) Quali sono le aree/terreni produttivi?
- 4) Cosa influisce sulla produttività/crescita? Quali forze (umane, naturali, soprannaturali) influenzano il successo di una produzione? (es. orto: concimazione, acqua)
- 5) In che modo si capisce che una pianta/albero cresce bene? Cosa contribuisce alla crescita della pianta?

3) CONOSCENZE NECESSARIE

- 1) Quali decisioni hai preso tu (tua famiglia) per ottenere risultati positivi?
- 2) Quali informazioni/conoscenze sono stati utili per prendere delle decisioni (tramandate, apprese a scuola, in corsi di formazione, dai media, da conoscenti, autoformazione ecc.) (I tempi di semina, date di una volta)
- 3) Ci fai un esempio?
- 4) Come scegli le colture da coltivare (anche nell'orto), ciò che cacci, ciò di cui vai alla ricerca (es. prodotti del sottobosco)? (scambio di semi)
- 5) Quali problemi incontri e quali limiti/vincoli devi tenere in considerazione in queste attività? (es. periodi in cui piantare, questioni economiche, Regole; dopo san Marco non potevi passare sui terreni degli altri perché l'erba stava crescendo)

4) EFFETTI SULL'AMBIENTE

- 1) Chi produce effetti maggiori sul tuo ambiente (campi, bosco)?
- 2) Cosa e/o chi fa succedere le cose? (forze naturali o soprannaturali; umani, animali, piante, santi, spiriti ecc.)
- 3) Il ruolo del governo e dei vari enti amministrativi (Comune, Comunità montana, Regione, Regole)?
- 4) Qual è la cosa migliore/peggiore che gli umani possono fare nel cacciare, coltivare (orto o campi), raccogliere prodotti del sottobosco (es. solidarietà/litigare; incuria, abbandono del territorio)

5) SODDISFAZIONE RISPETTO ALL'ATTIVITÀ LAVORATIVA SVOLTA

- 1) Che cosa ti piace/non ti piace di ciò che stai facendo (soddisfazione)?
- 2) Ci sono cose che devi fare che sono distruttive ma che non vorresti fare? (es. uso prodotti chimici nella coltivazione)
- 3) Le conseguenze del tempo/clima, governo, guerre, gente sulle attività legate alla terra/ambiente
- 4) Quali sono le forme alternative a questa per guadagnarsi da vivere. (Tu come ti guadagni da vivere? Vivi dei prodotti dell'orto?)

6) CAMBIAMENTI CLIMATICI

- 1) Hai riscontrato **cambiamenti nell'ambiente** e nella tua attività legata al lavoro agrosilvopastorale? (ad es. modifica nelle aree destinate a pascolo)
- 2) Che tipo di cambiamenti?
- 3) Ci sono dei **cambiamenti climatici**? Quali? In che modo si sono verificati?
- 4) A cosa ritieni siano dovuti le variazioni (ad es. stagioni più brevi) e i cambiamenti (assenza di stagioni intermedie)?
- 5) Che cosa gli umani possono fare al riguardo?
- 6) Ritieni che gli umani, come collettività o anche singolarmente, possono produrre effetti sulla natura e sul clima?
- 7) Hai notato cambiamenti nella presenza o nel comportamento di una specie dovuti alla presenza di un cambiamento nell'ambiente o climatico (ad es. dovuti al bosco che sopravanza o alla presenza di una specie animale o di un cambiamento climatico)?

The Shifting Biocultural World in Khoisan Southern Africa. An Interim Field Research Report for the Namibian Case Study

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Introduction.

A first field research period for this project was carried out in March 2014 in the Oshikoto Region in northern Namibia, more specifically at several places around a farming area called “the Mangetti-West” farms with a majority population of Khoisan-speaking ≠Akhoe Hai//om who are nationally subsumed under the minority group of “Bushmen” or “San”. Research at this field site is continuing at the moment with the help of a PhD student who is a temporary resident in the area and it will be concluded by another joint field research journey in August 2015.

Research tasks completed so far include a systematic and extensive trial of the animals-in-a-row task and other space orientation experiments. Also completed were free listing elicitations, semi-structured interviews and nature walks. All of these activities are continuing and will be completed in the upcoming research period. Systematic analysis will only take place after field research is complete. The results that are presented here are preliminary and they concern only the space orientation tasks and the free listing task.

Environmental and Social Changes in Namibia.

The last 25 years have seen considerable changes in both the environmental and the social conditions in northern Namibia. Therefore, a major challenge to social science studies of environmental perception, of climate change and its implications is the attempt to bring together changes that occur in the natural environment with changes that take place in cultural models that agents hold about this environment.

Comparing the results of the most recent field research with earlier visits to the field sites over the years (see Widlok, 1999) shows that there has been considerable change in almost all domains of life. People are today much less mobile, they are confronted with an influx of neighbouring groups and they much less rely on hunting and gathering than previously. One of the goals of the current project was therefore to take stock of the present state of ecological knowledge and to try to investigate the processes of change more systematically. Although it is generally assumed that there is no immediate or tight fit between environmental changes and changes to cultural models we urgently require more data and better theories that explain the interrelation between ecological environmental changes and the transformations of cultural models.

Results from Free Listing Tasks: Animals, Plants and People.

The purpose of the free-listing task was to get a first impression about what locals, using their own language, consider to be salient entities that are relevant in environmental change. The instructions were kept simple in that we asked (in their own language) a variety of respondents who were already known to us: “What are the entities that belong to x ...?” (or “*What is it that is part of x?*”) whereby we would consecutively insert for “x” vernacular labels for the categories “animals”, “plants”, “humans”, “the supernatural”, “the weather” and “the environment”. The

idea was to get an impression of both the diversity and the consensus in ecological knowledge with regard to the relevant agents and forces that effect environmental change.

In the Namibian field site the first two categories, animals and plants, were largely unproblematic in the sense that they generated more or less long lists of terms for plants and animals. One of the most striking results is that, although the Hai//om in question now live in an area that for some thirty years has been depleted of game animals and has been subject to massive influx of cattle, sheep and other domesticated animals, the category of “animals” (*xamanin*) was still almost exclusively filled with names of wild animals from the bush. The fact that cows, chicken, goats and dogs were visibly and audible all around us—whereas the animals they listed were not—did not have an effect on the content of their lists. Only two (young) individuals included some of the domesticated animals, and only very late in the sequence. Similarly, only few mentioned domesticated garden plants while everyone’s listings were dominated by trees, bushes and other wild plants.

How are we to explain this discrepancy? The respondents were leaving out the animals and plants that were so prominent in their here and now and in the lifeworlds of their dominant agropastoralist neighbours. When questioning respondents in subsequent interviews, they were happy to include domesticated animals in the “*xamanin*” (animal) category, but like insects, these animals were clearly not the prototypical animals that constituted this category. It may be suggested that the term “*xamanin*” should be translated as “wild animal” instead of “animals” (as the compilers of dictionaries of neighbouring groups suggest, see Haacke and Eiseb, 2002), but if that was a categorical difference, then no extension towards domesticated animals should occur. Furthermore, the same phenomenon was observed with regard to the plant category (*hain*) which, when being prompted in the free listing tasks, is readily extended to include all kinds of domesticated plants and still produced a very marked preponderance towards “wild” plants. We may therefore take these preliminary results as an indication that respondents were indeed abstracting from what has been their everyday situation for several decades (and in some cases for their whole lives), constructing a category that was defined at the same time “from a distance” of their present situation and on the background of a carved out “cognitive environment” suited for a hunter-gatherer group. There was no immediate feedback effect of environmental change onto the cultural categories.

While the length of the lists for animals and plants (and the sequences of these lists) differed across subjects, the overall tendency of highlighting undomesticated species was robust across subjects. Results differed much more with regard to the other domains investigated in which the diversity was such that there were very fundamental differences in the strategies of categorization.

The free lists for the category “humans” (*khoen*) showed a strong bifurcation. While many respondents produced a list of ethnic groups living in the country (with more or less names and with more or less completeness), there were several respondents who produced a very short list, consisting only of their own ethnic group “≠Akhoe” and that of the neighbouring “!Xû”. Both strategies follow well-known patterns of categorizing people in southern Africa: The categorization according to ethnic groups has been a dominant feature throughout the colonial period, in particular in South Africa’s sphere of influence that tried to cement ethnic categorization during the apartheid era. The second strategy responds to the wide-spread tendency for autonyms to translate as “real people/humans” and to implicitly or explicitly categorize other people as being outside that group, a tendency observed widely in sub-Saharan Africa and beyond.

At least over the last 25 years since Namibian independence, a lot of educational and media effort has gone into the broadening of the “people” category and the mobility of the population has been such that one would expect longer and more diverse lists to emerge under the key word “people”. Therefore, again, although people live in a wider social surrounding made up of many ethnic groups, are in fact dominated by other ethnic groups and by groups that are no longer defined only in ethnic terms but in terms of professions and office holders, they would only include in their free lists the two local hunter-gatherer groups as constituting the category “people” in their social environment.

While some respondents produced what we may want to call a birds-eye view, trying to cover all groups in the region, others produced an ethnocentric view. The interviews suggest that many respondents feel ease to shift between the two perspectives but do not develop an alternative perspective that would match more closely the complex social and political picture of the present. In either case, it seems that a few decades of social change were not sufficient to change the dominant cultural model. We may take this as an indicator that cultural models may not be quick in adapting to environmental change of the type that recent climate change and current political change produces. One working hypothesis for the ongoing research is therefore to see whether cultural models have a conservative bias in the sense that they are kept unchanged in a situation of change and that only in the long run this may eventually change the model. A few decades may be long in the context of man-induced climate change, but typically not in the context of established cultural models which may change at a much slower pace.

The other indication that the preliminary data provides is that changes to the cultural model are not of an on/off binary type, but rather one of “gracious” transition in which different responses are latently present so that they can be (re)activated when a situation comes up in which they are of relevance. Talking to people in conversation after the free listing task, they were ready to agree that there were indeed other animals, plants and people which, when being questioned directly, they would also include in these categories. In other words, there were many more latent members of that category than those that were spontaneously realized. Elements may fade in or fade out of a category and they can exist in a “dormant” state for considerable time. This is a major difference to natural species which in some cases may also increase or decrease but which in many situations of radical environmental change also disappear “for good”.

The natural selection metaphor that many natural scientists have internalized completely and which they often extend also to cultural features that go “extinct” shows its limits here. To put it bluntly: The ≠Akhoe Hai//om case suggests that cultural models and their features do not die out or get selected in the same way as natural scientists in their majority think about processes of environmental change. Human environments in that sense are limited selections from the surroundings. This is added evidence for the anthropological insight that there is no one-to-one correspondence between environmental conditions and cultural models, but that there is a considerable degree of freedom in constructing different cultural models in one and the same environment. It also questions the assumption that humans are trapped in a cultural model of their environment in a similar way as we tend to talk about animals who are said to be “embedded” in their natural niches.

As the data collection continues, we now seek to establish in this project to what extent ≠Akhoe Hai//om switch between models in their everyday pursuits. Do new events and experiences question and devalue the apparently self-evident cultural solutions and thereby require a re-adjustment of adaptive practices? If it is true that humans differ from animals in the way that they are not centred in their environment, but take an ex-centred position towards their

“co-world” (see Plessner, 1983: 86) and create new representations of that world in an open process, then we should be able to demonstrate this in the empirical record.

Results from Free Listing Tasks: Weather, Supernatural and Environment.

The initial results show some serious problems when trying to elicit free lists for the categories “weather”, “supernatural” and “environment” in Namibia. The weather category in Hai//om (and other, related languages) is rather specific in that the term one is forced to use for the elicitation already contains a list in itself. The term */nanutsi//haotsi≠δab* literally translates as rains-and-clouds-and-wind, which were exactly and not very surprisingly exactly the features that were contained in the list. The only additions to the list of three (rain, clouds, wind) were “sun” and “moon” in some of the free lists. The term */nanutsi//haotsi≠δab* itself is hardly used in everyday discourse, it only comes in because it is used in radio broadcasting as a translation for the English term “weather”.

Interview data also suggest that no abstract notion of “weather”, and even less so of “climate” is being used in everyday conversation and that technical terms that have been created in Khoesan languages by the media, by government and non-governmental agencies are slow to enter local language use. Not surprisingly for a region of the world with highly erratic rainfall and serious problems of draught there is a lot of talk about rain (or its absence), but this is usually connected to the planning of specific activities. For instance, forays into the bush are often not carried out under overcast rainy conditions during the wet season because it is known that snakes are very active under such conditions. Conversely, the onset of rains at the very beginning of the rainy season is an important factor for successfully harvesting swarming termites. However, all of these situations can be handled successfully and routinely without any reflection or conversation about the weather or the climate in general terms.

Similarly, there is little to no discussion of supernatural entities in everyday conversations. As with many groups in Africa the creator God (*!xub*) is seen as otiose and as not actively interfering with human affairs. There is the notion of a so-called lesser god (*//gãuab*), glossed by missionaries as “Satan” who is said to be present in sickness and healing, but again is not subject to abstract reflection. The appropriate means of dealing with these powers is through ritual activity (above all through trance dancing) and is left out of propositional discourse. As a consequence, the category of “supernatural” is very hard to convey to respondents. Various attempts consistently produced a one-entry category (*!xub*).

With no local word for “supernatural” we had to fall back to translations such as “things that you cannot see or touch” which initially produced some reactions such as “You mean like when you are blind?” or “Lions! You hear them but I never see one since I run away as soon as I hear them”. As already mentioned, a number of respondents named “God” (and “God” only) as belonging to this category, and there were isolated other responses which included “dreams” and “the wind”. The most marked pattern that emerged is that most respondents professed to lack knowledge of what cannot be seen and refused to speculate about it. There was no sense of anxiety or fear to talk about the domain, as one may suspect, but rather one of ignorance and a lack of ready-made propositions that people could rely on. Although most respondents are nominally Christians there is, at this stage, little evangelization taking place so that the temptation to use “borrowed discourse” of religious specialists with theological training is not pronounced. Rather, the category of the supernatural was effectively turned into “that which we [by definition] do not know much about”.

Finally, the category “environment” itself illustrated certain aspects of cultural diversity, even though not in the way that was anticipated. Given the common English meanings of the term, we were expecting diverging lists of features of both the natural environment (hills, rivers, etc.) and possibly also features of the man-made environment (roads, fences, houses) that would allow us to conduct a cultural-consensus analysis. There are terms for “environment” that people have heard of, partly because these terms are used extensively in the national radio and by teachers, development workers and bureaucrats. These are terms such as *≠namibeb* and *!ha!hais* that were originally coined by official language committees and recommended for official usage (Haacke and Eiseb, 2002: vii), but which are not commonly used in vernacular speech. In everyday conversation these learned constructions are not widely spread, and that is why we used them in parallel during elicitation to be confident that respondents knew roughly what we were interested in. In return, respondents produced consistently short lists, usually limited to very few items such as “houses/huts” and “fire places”. Thus, while the English meaning (and the official language policy in Namibia that is mapped onto it) primarily considers environment to be the natural environment with a latent extension to the man-made environment, we found the exact opposite with Hai//om respondents who were focusing on the man-made environment as that “which is around you” and extending it only when being prompted by us in further conversation.

Unlike many agricultural people in Africa (and the urbanized elites of today) who rigidly separate the (hostile) bush from the cultivated land, no such a separation was detectable in interviews or in the free listing exercise. *≠Akhoe Hai//om* seem to have a seamless perception of their surroundings as one environment that combines both “natural” and “man-made” features. In this respect they are in fact very close to the state-of the art scientific community in which this separation is also increasingly questioned.

Conclusions.

This is a preliminary report and further analysis will have to wait until field research is completed. On the whole the low degree of abstract reflection on matters relating to “the environment” or even causality relations within the environment suggest that non-linguistic tasks will continue to be important in this research and creative new ways of using such tasks are a research priority.

The space tasks that were conducted so far are only a beginning. In the so-called animal-in-a-row task interlocutors are asked to reproduce the direction and sequence of three toy animals standing in a row. Between seeing the sequence on one table and being asked to reproduce it on another table the subjects have to turn around in a 180 degree angle. This condition allows (at least) two solutions of the problem which are equally valid. Firstly, setting up the toy animals with regard to one’s own body, i.e. from left to right, the so-called relative or egocentric solution. Secondly, reconstructing the order of animals with regard to the geographical framework around, i.e. for instance with regard to east and west, the so-called absolute or geocentric solution.

Unlike most Europeans Hai//om solve this problem using the absolute option and they differ in this respect from Bantu-speaking residents of the same environment (see Neumann and Widlok, 1996). However, there are also many responses that need to be classified as “inconsistent”. This means that there is not a clear and “clean model”. Lest this be attributed to a poor administration of these tasks, it is important to recall that in virtually all contexts in which these tasks have been applied across the globe there were considerable amounts of “mixed”

results. The types that have been established (see Levinson, 2003) are always based on a statistical tendency across a sample, significant enough to be able to state that we are indeed dealing with different cultural models, but with enough “aberrant” solutions to prohibit us from thinking about these cultural models as mechanistic blueprints that allow only a single strategy to individual members of that language community. Rather, this underlines the point made earlier, namely that there is considerable freedom in the way in which humans use cultural templates right down to those non-linguistic strategies that are normally beyond our conscious manipulation.

There are some tendencies that begin to emerge from the statistics. One is that when the running of animals-in-a-row tasks is repeated over a long period of time, it appears that there is a move away from the absolute frame of reference. There are a number of possibilities of how to interpret these results. One is to acknowledge a change in cultural models in a society that is gradually shifting from an absolute to a relative frame of orienting oneself. However, it is important to note that this is not a wholesale shift because, as mentioned, there had been relative responses in the past and there continue to be absolute responses in the present. Either we are dealing with a very slow and gradual change or the two frameworks coexist, but that one is more or less in the background and the other one more or less prominently in the foreground. This would connect back to what was discussed earlier with regard to the latency of models (or aspects thereof) that continue in the background.

In some cases we were able to account for the “exceptions” by looking at individual properties of the respondents. It seemed, for instance, that those who had been trained to drive a car would use the left/right framework more often, which of course makes intuitive sense. Similarly, schoolchildren who are exposed to the relative framework can be expected to shift towards the relative frame of reference. However, none of these indicators could explain the whole picture, since there were exceptions to the exceptions so much so that our current preliminary conclusion is that individuals can indeed switch frameworks in either direction when they do such a task with a period of several years in between. There appears to be something like a social life of cultural models as respondents in a community shift over time and, probably, also in relation to changes that take place in the environment. Establishing what exactly the trajectories are along which these changes occur is the task ahead.

Acknowledgements.

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The Moon Makes Yams Grow: Tongans (Polynesians) and Nature.

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Introduction.

Climate change is affecting communities all over the world. Local populations perceive a number of the changes in their environment due to climate change and explain them using the knowledge they have and the beliefs they hold about their world. We have labeled the encompassing knowledge structure—organized and related units of knowledge—about various components of one’s physical and spiritual world—a Cultural Model (from now on, CM) of Nature.³³ This CM is a major component of local knowledge and it plays a fundamental role in the perception and interpretation of any phenomena related to changes in the environment, including climate change.

This report is about the preliminary results from the analyses conducted on data collected in the Kingdom of Tonga (from now on, Tonga), Polynesia, in search of a Tongan CM of Nature. Tongan communities are deeply affected by changes in the climate, including weather unpredictability (including increasing number of typhoons and length and occurrence of dry and wet seasons), the raising level of the ocean waters, and the variability of fish supplies (changes in quantity and size, place, and time of the year).

The report is organized in several sections. In the first section, I provide a brief introductory description of Tonga and specifically of the small community I investigated. In the second, I describe the methodology used to collect and analyze the data. Then, I report about the preliminary results of the analyses. In the fourth section, I present an hypothesis about the Tongan CM of Nature I was able to infer from the results of the analyses. Then, I continue the report by looking at the internal causal structure of this CM. Finally, I look at possible future activities—data collection and analyses—that would answer some of the questions arising from the preliminary results presented.

Place of Research

The Kingdom of Tonga (Tonga) lies in a south-west to north-east line in the South Pacific ocean. Most of the islands are raised coral islands, some are volcanic, and a few are atolls. Coral beaches lined with palm trees and emerald lagoons with luxuriant tropical vegetation are characteristic features. The Kingdom consists of approximately one hundred fifty islands, thirty-six of which are inhabited and divided into three groups: Vava’u in the north (also the name of the major island in this group), Ha’apai in the center, and Tongatapu in the south (also the name of the major island in this group). The capital town Nuku’alofa is on Tongatapu island. The total population reached 103,036 according to the latest census (2011), and more than a third (35,778) lives in the capital.

³³ I capitalize Nature when the word appears as defining a CM. I also want to draw attention to the fact that capital letter ‘Nature’ and small letter ‘nature’ have two distinct meanings. The latter is typically intended to mean a specific part and type of the environment (e.g., woods, trees, rivers, etc.) or some biological given aspect of existence (i.e., instinct), while the former may include all that exists.

Tonga is a constitutional monarchy headed by King Tupou VI. He is the direct descendant of King George Tupou I who introduced the Tongan Constitution in 1875. Traditional Tongan society had at its top the *ha'a tu'i* 'royal line,' followed by the *hou'eiki* 'chiefs,' *ha'a matāpule* 'talking chiefs,' *kau mu'a* 'virtual or would-be talking chiefs,' and *kau tu'a* 'commoners' (Gifford, 1929). All the titles were inheritable. The 1875 Constitution introduced the figure of the *nōpele* 'noble' in an attempt to substitute that of the chief in some of its traditional prerogative (such as owning land), but this latter figure still exist. Moreover, an increasing market oriented economy and an expanding bureaucracy have lately added a middle class that spans some of the traditional strata from commoners to chiefs (Gailey, 1987; Linkels, 1992; van der Grijp, 1993; James, 2003).

Kinship ties are of paramount importance in Tongan society. The two major kin groups are *fāmili* and *kāinga*. A *fāmili* 'family' is made up of a married couple and their children living together in the same house and it usually includes some male and/or female collaterals and affinals (usually, son-in-law or daughter-in-law). The *'ulumotu'a* 'head' presides over this group. The *kāinga* 'extended family' is a group of people living in different households, mostly in the same village, but often including residences in other villages. They are related to one another by a bilateral relationship of consanguinity (cognatic system or kindred). A specific *'ulumotu'a* 'head' presides over this group besides his own family. In a changing contemporary Tongan society, membership to this kin group is not strictly following traditional guidelines and inclusion is more and more restricted to closer relatives than in the past (van der Grijp, 1993:135, 2004; Evans, 2001). The basic parameters that are applied in establishing hierarchy at any level are gender and age, with the former preceding the latter. A female is always considered higher in rank than a male.

Nobody visiting Tonga will fail to notice the overwhelming presence of Christianity throughout the Kingdom. From the first failed attempt in 1797 to Christianize the islands by Wesleyan missionaries, the middle of last century saw an increasing presence of Christian religions (Lātūkefu, 1974). The contemporary religious landscape of Tonga is characterized by many Churches, The major one is the Free Wesleyan Church (37.3 %) that is also the 'official' religion of the Monarchy.

Tongan is an Austronesian language of the Oceanic subgroup. It belongs to the Western Polynesian languages, specifically the Tongic group. Seventy years as a British protectorate (until 1970) has resulted in the introduction of English. Much of the village population still knows little of this language, however, in Nuku'alofa and other major towns, most business transactions are conducted in it. While English is taught in elementary schools and is the language of most high school instruction, Tongan is the language commonly spoken in the streets, shops, markets, schools, offices, and churches.

The first European visitors in the late 1700s spoke of a population scattered throughout a densely cultivated land (Ferdon, 1987). Contemporary Tongans are now concentrated in villages and small towns. Most villages lie around an empty area, called *mala'e*, used for social gatherings and games. Contemporary houses are usually rectangular and made of timber with corrugated iron roofs. The toilet and the kitchen are traditionally in separate huts, but modern houses have them indoor. Little furniture is used.

The village where I conducted the data collection is located on the island of Vava'u, in the northern archipelago by the same name. It is a small village of approximately one hundred and seventy inhabitants living in thirty-six houses. In the village, there is one main church (Free Wesleyan Church) with an adjacent hall for communal activities and another smaller church (Latter Day Saints). The elementary school is placed outside the village perimeter. Junior high and older students go to school in the main town of Neiafu, site of the local government and Governor.

The village lacks a noble, but has a residing chief. A *mataāpule* 'talking chief,' is also in residence. The local Wesleyan minister is an important member of the community. Ministers, however, are rotated every four years, and only their office and not them as individuals is part of the long lasting social fabric of the village. Another prominent figure is the elected '*ofisa kolo* 'town officer.' Thus, the village social structure suggests three formal positions: a chief, a ceremonial officer, and an elected town officer. One needs also to add the '*ulumotu*'a of the nine *kāinga* in which the population is divided. The main income of the villagers comes from subsistence. Farming, shell gathering and fishing are the most common activities. However, there are also a number of wage laborers earning cash and the cash economy has become more significant in the last couple of decades. Cash and goods from relative abroad—New Zealand, Australia, and the US, mainly—has also recently become a relevant source of income for the villagers.

The effects of climate changes have not left untouched this small Polynesian kingdom. The level of the ocean water has increased and tides are finding their way inland causing relevant damage to cultivated plots. Typhoons have become more frequent with occasional loss of lives in addition to the destruction of houses and vegetation, including numerous trees (almost all fruit-bearing, e.g., coconut tree, mango, papaya, and banana). A well-established weather pattern—alternating between rainy and dry seasons—has also been affected with longer drought spells and with rain that has become unpredictable in its quantity and distribution over the yearly cycle. Finally, the availability, quantity and size of fish has also been affected in such a way that villagers rely less on their own fishing activities and more on the fish market³⁴ in the main town and port of the island.

Methodology.

The methodology employed within this project regards both data collection and data analysis. I conducted my field work in Tonga for 5 weeks, from May 8 through June 12, 2015. The village in the northern Tongan archipelago of Vava'u, where I collected the data, is very familiar to me since my first visit in 1991.

Data Collection. The data was collected using a variety of methods, including: Nature walks, open interviews, semi-structured interviews, free-listing tasks,

³⁴ The fish sold in this market is sometimes caught locally, but it often comes from larger commercial fishing boats.

and space tasks. Given the extensive familiarity I have with Tonga and specifically with the community focused on, I started my data collection with a few nature walks and open interviews. The reason being that of familiarizing myself again with the Tongan physical environment, both spatially/visually and linguistically, while freely talking about it (in Tongan).

Later, I conducted 18 semi-structured interviews (see Appendix 1 and 2 for content) with a sample of the community/village population obtained keeping in mind parameters such as age, gender, education, *kāinga* ‘extended family’ membership, occupation, and religion. All the interviews were video-recorded and later transcribed in the field with the help of native speakers.

I also administered free listing tasks to 27 individuals—representing a similarly composed sample of the local population—about the major components of Nature: plants, animals, physical environment, weather, humans, and supernatural. Finally, I administered the Animals-in-a-Row Task (from now on ‘space task’) to this same group of individuals. Both the free listing tasks and the space task were video-recorded and the results were later digitally recorded.

Data Analyses. I conducted three types of analyses on the transcriptions of the semi-structured interviews: a key words analysis, a gist analysis, and a reasoning/causality analysis. The results of the free listing tasks were analyzed to discover the frequency of occurrence of each item mentioned in all the lists obtained. The common assumption behind any free listing tasks is that ‘first listed’ items stand for ‘more salient’ items. Similarly, the results of the space task were analyzed for frequency of occurrence of relative FoR or absolute FoR choices for each individual and across the 27 individuals who were administered the task.

Results of the Analyses.

The report about the results of the administration of the space task in all the communities interested by this research project appears as a standing alone chapter in this volume and it is titled “Results of the Animal-in-a-Row Task” by Giovanni Bennardo. Below, I report mainly about the results of the analyses conducted on the transcribed semi-structured interviews. I close the report by briefly commenting on the results of the free listing tasks.

What Subjects Said. During the interviews, the subjects often mentioned changes in their environment and many of them happens to be related to climate change. The following is a list of those locally perceived changes:

- Pattern of Heat/Sunny Days;
- Pattern of Rain Downpour;
- Pattern of Typhoon Occurrence;
- Rising Level of Ocean;
- Availability and Size of Fish;
- Availability and Size of Shellfish.

I now introduce examples of sentences from the transcriptions and will later make some inferences from them that lead to my proposal of a cultural model of nature for Tongans. The sentences represent examples of statements often repeated across the sample of subjects interviewed.

tó 'a e 'ufi ('i) he mahina katoa
“plant yams with full moon”

ko e 'ufi ma'u ('a) e ivi mei ia
“yams get force from it”

koe'uhi:
“because”:

“when the moon is full, it gives energy to the soil and then the yams grow”
“yams get energy from sun, soil, and from water”
“soil gets energy from full moon and water”
“weeds get energy from soil”
“we must weed otherwise yams do not grow well”
“nature masters yams, etc.”

About Nature:

“humans belong to nature”
“humans cannot separate from nature”
“God, humans, nature belong together”
“when I see nature, I see God”
“God is in nature, but masters it”
“*they* [supernatural beings] are separated from nature because one cannot see them”

Inferences from What Subjects Said. From the content of these shared ideas subjects felt compelled to express linguistically in the interviews, I inferred a number of concepts that are presented individually below. These concepts immediately follow in bold the statements they refer to more directly.

“when the moon is full, it gives energy to the soil and then the yams grow”
physical environment (moon, soil) are related to plants (yams)

“yams get energy from sun, soil, and from water”
“soil gets energy from full moon and water”
“weeds get energy from soil”
energy is transferred among physical environment and plants

“we must weed otherwise yams do not grow well”
energy is limited

“nature masters yams, etc.”
nature is ruled by its internal laws

“humans belong to nature”
“humans cannot separate from nature”
nature includes humans

“God, humans, nature belong together”
“when I see nature, I see God”
supernatural is included in nature

“God is in nature, but masters it”
“*they* [supernatural beings] are separated from nature because one cannot see them”
supernatural is separated from nature

Hypothesis about Cultural Model of Nature in Tonga.

From the texts analyzed and from the inferences made from them, I can now hypothesize the following content for the CM of Nature for Tongans:

1. *physical environment, weather, plants, humans (and animals?) belong together*
2. *supernatural/God is separated from nature, it masters nature*
3. *supernatural/God is not separated from nature, it is everywhere*

This preliminary hypothesis contains some issues that need to be pointed out;

- First, the internal relationships among the elements making up nature needs to be investigated further (see the missing role of animals in point 1);
- Second, there is a contradiction in the model between point 2 and point 3 (relationship between God and nature) that needs to be clarified;
- Third, it would be useful to think about the Polynesian (and Tongan) traditional concept of *mana* or ‘vital force’ that seems to be still persisting in spite of 150 years of Christianity (see Bennardo, 2009, p. 188-89)

Causality Structure.

In Bennardo (2014), I suggested that any CM of Nature would include a causality structure that can be represented by a causal model (see Sloman, 2009; Rips, 2011). In that same work, I introduced three possible causal models that could be eventually found across cultures. Which of those three suggested causal models can be hypothesized as representing an appropriate one to represent causality within the Tongan CM of Nature just introduced?

It appears that the Tongan CM of Nature includes causal model one (see Figure 1) and causal model two (see Figure 2). In fact, the place of the supernatural, i.e., God, as an overall constituent of Nature is often explicitly stated.

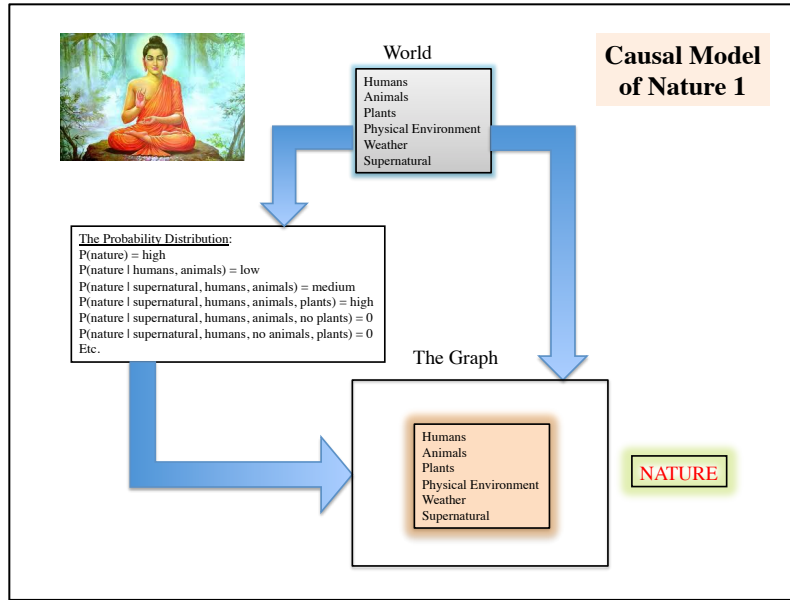


Figure 1: Causal Model of Nature 1 (from Bennardo, 2014)

At the same time, that wholeness is also explicitly denied on several intra-subjects or across subjects instances .

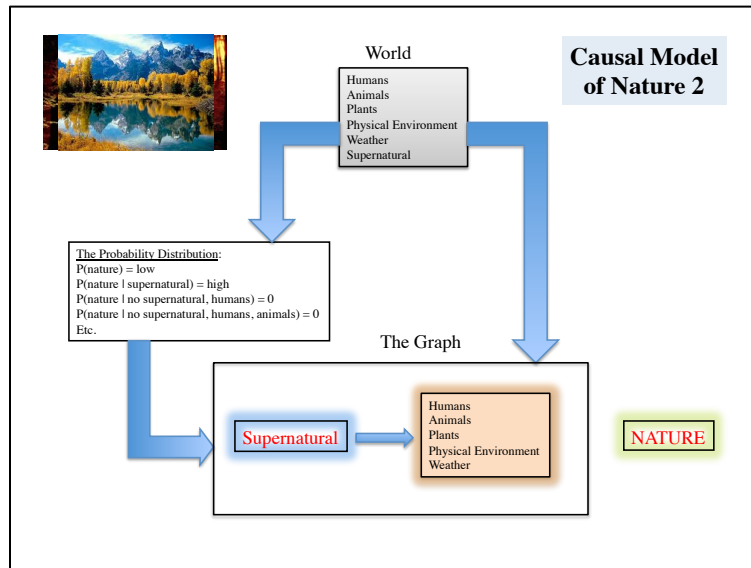


Figure 1: Causal Model of Nature 2 (from Bennardo, 2014)

In addition, while it seems that humans, plants, physical environment, and weather belong together, the place of animals, i.e., mammals, fish, birds, insects, and reptiles, in the model is not clear and it was not talked about by the subjects. Thus, it needs to be investigated further in the near future.

Results of the Free Listing Tasks.

I administered the free listing tasks about the fundamental components of Nature (plants, animals, weather, physical environment, humans, and supernatural) to 27 subjects, 14 males and 13 females, ranging in age from 28 to 80 (females range 28-76; males range 30-80). In Table 1, I am indicating the free listing categories I used—notice that the category ‘animals’ had to be emically divided in animals (mammals), birds, fish, and insects, since the word for animals in Tongan (*‘fangamanu’*) refers only to mammals. In the same Table, I am indicating the total number of words used, the average number of words, and the range for each category.

Table 1: Results of Free Listing Tasks

Category	Total	Average	Range
plants	812	30.07	15-66
fish	563	20.85	9-37
people	385	14.26	7-28
birds	279	10.33	5-18
weather	261	9.67	5-17
physical environment	243	9.00	2-15
animals	224	8.30	5-15
supernatural	167	6.19	2-13
insects	38	1.40	0-10

Table 2 contains the adjusted results of the free listing tasks with the categories as they were planned by the research group. That is, they represent the etic view of those components of Nature. I present these data so that it could possibly be used later for a cross-cultural comparison among all the results obtained in the various field sites for this research project.

Table 2: Adjusted Results of Free Listing Tasks

Category	Total
fish/birds/animals/insects	1,104
plants	812
people	385
weather	261
physical environment	243
supernatural	167

Words for plants and fish top the chart with an average of 30.07 (and a 15-66 range) and 20.85 (and a 9-37 range), respectively. These results reflect the nature of the interview—it was about daily activities—but they also tell a story about the keen attention (and memory space) members of the community devote to these two components of their environment.

The detailed contents of the free lists are presented in Appendix 3 and they highlight how specific members/words of the emic categories are collectively privileged (remembered and mentioned more often) over others co-present in the lists. I will use these results to refine the hypothesized Tongan CM of Nature by treating those members/words as building blocks for the final CM that will eventually be suggested. At the same time, those same lists will be used to administer further tasks, such as sorting tasks (relationships within a category) and rating tasks (relationships across categories). The former type will elucidate salient concepts used to group members of the various lists. The latter type will highlight perceived relationships among members of the various lists, thus, providing indications about possible causal relationships among the components of Nature. Again, the future results would contribute to refine and clarify the already hypothesized causal model—I actually suggested two possibilities from the results of linguistic analyses—that is part of the Tongan CM of Nature.

Conclusion.

The first batch of data collected and the results of the analyses conducted on them have already allowed to propose a preliminary hypothesis about the Tongan CM of Nature. However, I have indicated some issues that have emerged from the preliminary hypothesis. Much more work is in front of us to clarify many issues left unclear/unsolved by the research conducted so far.

First, the role of specific components of Nature, e.g., animals, needs to be investigated further and possibly clarified. Second, it is left to be specified and possibly discovered what specific relationships (causal and others) may exist among all the components of Nature. And third, once the hypothesized Tongan CM of Nature (or more than one) has been refined, it needs to be seen if agreement/disagreement among subjects exists about the model/s to support the hypothesis.

Thus, I plan to conduct a *consensus analysis* in the community investigated about the CM/s suggested. The results of such an activity may eventually elucidate/highlight and support the presence of one specific (or more than one) CM and/or culture. Finally, if more than one CM are discovered, their distribution within the community would highly enhance our understanding of the various type of local knowledge used by community members once climate change effects impact and modify their traditional expectations about how Nature works.

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APPENDIX 1

SEMI-STRUCTURED INTERVIEW

Questions About Daily Activities

1. Personal Questions Precede the Following Ones:
2. Describe your work/job (which relates to primary food production).
3. What is your typical work/work-day?
4. What is the rhythm of work in this area... Or actual activities?
5. What are some of the essential knowledge, skills, experience you need to be a successful food producer?
6. What are considered 'productive activities'?
7. Which fields/sea areas/etc. are productive?
8. What affects productivity? What forces have an influence on production success?
9. What is meant by growth, why do plants grow?
10. What are the key decisions ___x___ must make to be successful?
11. What information do you need to make decisions?
12. How do you choose what crops to grow, what to fish, what to go after?
13. What are some of the constraints/problems you face as a food producer?
14. Who or what affects your environment (fields, forest, sea, etc) the most?
15. What is worst/best thing humans can do in fishing/farming/etc.?
16. What do you like/not like about what you're doing (satisfaction)?

Questions About Climate Change

17. What changes have occurred in your work/environment?
18. Why are there these changes/variations?
19. Weather change, how?
20. What can humans do about it?
21. Can humans/human activity affect nature/weather/wind/currents?

APPENDIX 2

SEMI-STRUCTURED INTERVIEW TRANSLATED IN TONGAN

Questions About Daily Activities

1. Personal Questions Precede the following ones:
2. FAKAMATALA'I MAI HO'O NGAUE
3. KO E HA' HO'O ONGO'I KI HO'O 'AHO NGAUE TU'UMA'U?
4. KO E HA' E HOKOHOKO HO'O NGAUE FAKA'AHO/UIKE/MAHINA?
(TOOTA'U = PLANTING)
5. KO E HA' HO'O 'ILO, POTO NGAUE, MO HO'O TAUKEI 'OKU FIEMA'U KE HOKO KO HA FEFINE NGAUE TU'UMALIE?
6. KO E HA' E NGAahi ME'A/NGAUE 'E FAI KE HOKO' (NGAAHI ME'A) KE FAKATU'UMALIE?
7. KO E HA' E NGAahi MALA'E 'I HE NGAUE' 'OKU HOKO KO E FAKATU'UMALIEANGA?
8. KO E HA' E ME'A 'OKU NAU FAKAFE'ATUNGIA'I?
9. KO E HA' E ME'A 'OKU TUPU AI E 'AKAU'?
10. KO E HA' E ME'A 'OKU KE FAKAPAPAU'I 'E HOKO KO E FAKATU'UMALIE KIATE KOE ('I HO'O NGAUE)?
11. KO E HA' 'A E TAUKEI/'ILO 'OKU KE FIEMA'U KE FAI'AKI HO'O TU'UTU'UNI?
12. ANGA FEFE' HO'O FILI 'A E FALA KE NGAUE: LALANGA/FINGOTA?
13. KO E HA' E NGAahi PALOPOLEMA 'OKU KE FETAULAKI MO IA 'I HO'O NGAUE?
14. KO HAI PE' KO E HA E ME'A 'OKU NE FAKAFE'ATUNGIA'I HO 'ATAKAI?
15. KO E HA' E ME'A LELEI TAHA PE' KOVI TAHA 'OKU LAVA FAI 'E HA FEFINE 'I HE'ENE NGAUE?
16. KO E HA'E E ME'A 'OKU SAI'IA LAHI 'I HO'O NGAUE?

Questions About Climate Change

1. KO E HA' 'A E NGAahi LILIU 'OKU HOKO 'I HE 'ATAKAI HO'O NGAUE?
2. KO E HA' E UHINGA 'OKU HOKO AI E NGAahi LILIU KO IA'?
3. KUO 'I AI HA NGAahi LILIU 'I HE 'EA?
4. KO E HA' E ME'A 'E MALAVA E TANGATA KE FAI KI AI?
5. 'E LAVA E NGAahi NGAUE 'A E TANGATA 'O FAKAFE'ATUNGIA'I 'A NATULA, EA, AU, LA'A, HAVILI, AFA'?

APPENDIX 3

RESULTS FOR EACH FREE LISTING TASK.

‘AKAU ‘PLANT’

Frequency List

1	mango	27
2	niu	24
3	mei	22
4	lesi	20
5	vavae	19
6	paini	18
7	tava	15
8	tavahi	13
9	fau	12
10	moli	11
11	fiki	11
12	kuava	11
13	toi	11
14	tongo	11
15	ahi	10
16	fekika	10
17	ifi	10
18	kalosipani	10
19	nonu	10
20	pua	10
21	pua tonga	10
22	toa	10
23	ai	9
24	hopa	9
25	koka	9

Adjusted Frequency List

1	mango	24.56
2	niu	18.95
3	mei	15.79
4	lesi	15.07
5	vavae	12.64
6	paini	10.38
7	tava	10.07
8	tavahi	9.12
9	kuava	8.20
10	toi	6.96
11	moli	6.93
12	motou	6.74
13	ifi	6.69
14	fekika	6.15
15	ngatata	5.84
16	toa	5.39
17	pua	5.34
18	mo'osipo	5.07
19	siaine	5.07
20	pua tonga	5.02
21	hopa	4.81
22	vi	4.77
23	nonu	4.76
24	ahi	4.73
25	ai	4.65

FANGAMANU 'ANIMAL'

Fangamanu 'animal' (mammals)

1	puaka	27
2	pulu	27
3	hoosi	25
4	kuli	23
5	sipi	18
6	kosi	16
7	pusi	14
8	kumá	13
9	lapi	1
10	tia (deer)	1
11	tongiki (donkey)	1

Manupuna 'bird'

1	peka	24
2	sikiviu	24
3	lupe	22
4	sikotá	18
5	tala	18
6	lulu	16
7	motuku	16
8	kiu	14
9	kulukulu	13
10	kalae	12
11	misi	10
12	veka	9
13	moa	8
14	ngongo	8
15	fuleheu	6
16	koki	6
17	misi 'uli	6
18	pekepeka	5
19	enga	4
20	helekosi	4
21	pato	4
22	toloa	4
23	hengehenga	3
24	kapatoka	2
25	lofa	2

Ika 'fish'

1	anga	24
2	ngatala	20
3	tofua'a	20
4	lupo	17
5	tanutanu	17
6	sokisoki	16
7	toke	16
8	sipesipa	14
9	manini	13
10	matu	13
11	te'efo	13
12	fua	12
13	palu	12
14	tuna	12
15	hakulá	11
16	hapatu	11
17	nofu	11
18	pone	11
19	fonu	10
20	oo	9
21	sifisifi	9
22	ume	9
23	hohomo	8
24	kanahe	8
25	lofa	8

Inisekite 'insect'

1	molokau	6
2	mongomonga	6
3	hone	2
4	pi	2
5	he'e	1
6	kelemutu	1
7	ló	1
8	pepe	1
9	unufe	1

Moko 'cold' (reptiles)

1	moko	8
2	fokai	1
3	ngata	1

‘EA ‘WEATHER’

1	momoko	25
2	mafana	24
3	afā	23
4	uha	18
5	afu	17
6	la'á	17
7	havili	16
8	vela	14
9	mokomoko	12
10	ao'aofia	10
11	hako	9
12	ahiohio	7
13	malu/malumalu	6
14	matangi	5
15	mofuike	5
16	fakapopo'uli	4
17	hivilivili	4
18	alotamaki	3
19	hahau	3
20	tafitonga	3
21	afua	2
22	alomalie	2
23	malohi	2
24	angi'iki	1
25	ea lelei	1

**‘ATANAKI
‘PHYSICAL ENVIRONMENT’**

(Me'a ngaohi pé fa'u 'e he tangata;
Me'a fakatupu fakanatula)
‘Thing made by humans;
Thing that grows naturally’

1	one'one	26
2	tahi	23
3	kelekele	22
4	maka	22
5	mo'unga	16
6	hakau	15
7	lilifa	12
8	vai	9
9	feo	7
10	liku	7
11	fonua	6
12	matatahi	5
13	fetu'u	4
14	mahina	4
15	mo'unga-afi	4
16	kele	3
17	la'á	3
18	langi	3
19	loloto	3
20	makamaka	3
21	moana	3
22	tele'a	3
23	ulu'ulu	3
24	vaitafe	3
25	'ao	2

KAKAI 'PEOPLE'

1	faifekau	22
2	tu'i	22
3	faiako	20
4	'ofisa kolo	18
5	hou'eiki	17
6	neesi	13
7	setuata	13
8	minisitá	12
9	polisi	11
10	nopele	10
11	palemia	9
12	toketá	9
13	matapule	8
14	pilinisesi	6
15	pulefakavahe	6
16	sotia	6
17	tufunga	6
18	kovana	5
19	kuini	5
20	patele	5
21	pailate	4
22	palesiteni	4
23	pilinishi	4
24	pisope	4
25	fa'e	3

**MAFAI FAKALEVALEVA
'SUPERNATURAL'**

1	'Otua	27
2	tevolo	24
3	setane	20
4	laumalie	16
5	Sisú	9
6	Eiki	6
7	Siova	6
8	laumalie 'uli	5
9	angelo	4
10	lusefá	4
11	pinono	3
12	Tamai	3
13	Atonai	2
14	Elohimi	2
15	laumalie kovi	2
16	me'akehe	2
17	palepalenga'akau	2
18	Satai	2
19	Ta'ehamai	2
20	temenió	2
21	Tu'i	2
22	afiona	1
23	Alo	1
24	angahala	1
25	ata	1

**Preferences for a Frame of Reference
Among Primary Food Producers across Cultures:
Results of the Animals-in-a-Row Task**

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Space and Cultural Models.

The definition of a good number of Cultural Models (from now on CM) of Nature³⁵ in communities all over the world opens the possibility of investigating a significant aspect of human cognition, the role played by space. The constructive role that space plays in cognitive architecture and development has been widely demonstrated (Gattis, 2001; Jackendoff and Landau, 1992; Jackendoff, 2002; Lakoff, 1987; Levinson, 2003; Mandler, 2004, 2008; Mix, Smith, and Gasser, 2010; Schubert and Maass, 2011; Slobin, *et al.*, 2010; Talmy, 2000a, b). For example, Clark (2010) argues that space and language perform similar cognitive functions, namely, they reduce the complexity of the environment. Space grounds language, and Spivey, Richardson, and Zednik (2010) convincingly show how abstract verbs are understood in terms of spatial relations (2010: 33). In addition to the contribution of space to the construction of language, the idea that “abstract concepts are connected to space at a deep, unconscious level—literally the product of neural juxtaposition” (Mix, Smith, and Gasser, 2010: 5)—leads one to expect a very early reliance on spatial information in cognitive development. This is exactly what Mandler (2004, 2008) demonstrates in her research about cognitive development in pre-verbal children.

Recently, once established that space, i.e., spatial relationships, plays a fundamental role in the development of cognition, in the formation of concepts (see the relationship between space and time, e.g., Boroditsky, 2000; Bender, Beller, and Bennardo, 2010; Ramscar, Matlock, and Boroditsky; 2010), and in the construction of language, researchers have focused on the role it plays in social cognition. “The results converge in the insight that much of social thinking builds upon spatial cognition” (Schubert and Maas, 2011: 3). In other words, it is now being demonstrated that “space plays a role for thinking that goes far beyond a medium for communication. Indeed, it seems that it can become the medium of thinking itself, with spatial and social cognition being closely and intrinsically intertwined” (*ib.*: 3). Since space—and the relationships that constitute it—is a very early contributor to the development of cognition, concepts formation, and language, and since the same perception-action couplings are at work in both spatial and social cognition (see Tversky, 2011), then, it is plausible to expect that it may play a relevant role in the construction of knowledge representations as cultural models. Thus, we can find the preference for a specific set of spatial relationships (e.g., a Frame of Reference, from now on FoR) replicated in the construction of other domains of knowledge, that is, a cross-domains homology.

³⁵ I capitalize Nature when the word appears as defining a CM. I also want to draw attention to the fact that capital letter ‘Nature’ and small letter ‘nature’ have two distinct meanings. The latter is typically intended to mean a specific part and type of the environment (e.g., woods, trees, rivers, etc.) or some biological given aspect of existence (i.e., instinct), while the former may include all that exists.

Another relevant finding in support of the role of space in mind is the one presented by Shimizu's (2000a, 2000b, 2011) work on the construction of self (i.e., proprioception). Shimizu shows how the CMs of self in the US, Japan, and China reflect spatial features (e.g., focus on other-than-ego instead of on ego) in their structural compositions that correlate well with the respective preferences about the representations of spatial relationships (Shimizu, 2009; see also Nisbett, 2003; D'Andrade, 2008). In addition, in 2009, Bennardo showed how a Tongan preferential organization of the representation of spatial relationships is replicated in a good number of other domains of knowledge, e.g., time, possession, kinship, and social relationships (see the results of two NSF grants #0349011 and #0650458; PI Bennardo). He proposed that a preference for organizing knowledge about space (i.e., a foundational CM) contributes to the generation of CMs in other domains (see also Shore, 1996).

We need to clarify the distinction between a foundational CM and a CM. The former refers to simpler and more abstract models that organize only few bits of knowledge during the earliest stage of cognitive development, such as those within ontological domains, e.g., space, time, quantity. They are out of awareness and it is very difficult to bring them to consciousness. The latter refer to larger and less abstract models that encompass knowledge from a variety of source domains. They are also mostly out of awareness, but can be brought to consciousness either by others (e.g., researchers) or on occasion by one's self (see Bennardo and De Munck, 2014). Foundational CMs participate in the construction of larger CMs. For example, a preference for organizing spatial relationships in a radial manner—that is, organized around a point other-than-ego with consequent back-grounding of ego and foregrounding of other-than-ego—is replicated in other domains of knowledge, e.g., kinship relations constructed by starting from a sibling and not from ego. Bennardo and Read (2011) demonstrated empirically that this preference in the Tongan kinship domain resulted in performances on kinship tasks that were more correct and faster when a task required an individual to start reasoning from a sibling instead of from ego.

Thus, we are convinced that a preferential way in organizing the representation of spatial relationships (e.g., use of relative or absolute or radial FoR)—hence, a foundational CM (Bennardo, 2009)—can play a salient role in the organization of larger CMs, and specifically, a CM of Nature. After all, the conceptualization of nature and the relationship of primary food producers to nature for production relies on a spatial dimension of knowledge and perception. The availability of the CMs of nature preliminarily hypothesized in the many communities investigated makes it possible to find supporting evidence toward the hypothesis just advanced. The findings about space can be used for a comparison with those about CM of Nature. We expect the comparisons to provide evidence for a preference in space to match a specific way of conceptualizing Nature, that is, a CM of Nature. Hence, we anticipate to find support for an active participation of space in the construction of more complex cognitive realms.

Collecting Data about Preferences for Frames of Reference (FoR).

Data was collected about a possible preference in representing mentally spatial relationships, that is, the use of a FoR in long-term memory. The task used is called 'Animals-in-a-Row' (from now on 'space task') and was developed by the Cognitive Anthropology Group at the Max-Planck Institute, Nijmegen, The Netherlands, and used by many scholars including Levinson (2003), Bennardo (2009), and Dasen and Mishra (2010). Subjects participating in the space task are required to stand in front of a table (or available surface). On the table they are shown a set of three small plastic farm animals—a cow, a pig, and a horse (the animals may differ in each field

site to match locally familiar ones)—standing in a row, all facing the same direction, either to the right or the left on the transverse axis in front of the informants. Subjects are asked to memorize the position of the animals. When they are ready to go to the next step (typically, after a few seconds), the animals are taken away and a minimum of 60 seconds need to elapse in which some conversation takes place between the informant and the researcher (this is done to engage long term memory).

Thereafter, the subject is directed to another table opposite the first one requiring a 180 degree rotation from the previous position (see Figure 1). The researcher then hands the three animals to the subject and asks to place them on the new table in the sequence and direction memorized. The trial is repeated five times for each informant and each time the sequence and direction of the three animals changes randomly (a variation of this task was introduced in Levinson, 2003, and used by Dasen and Mishra, 2010).

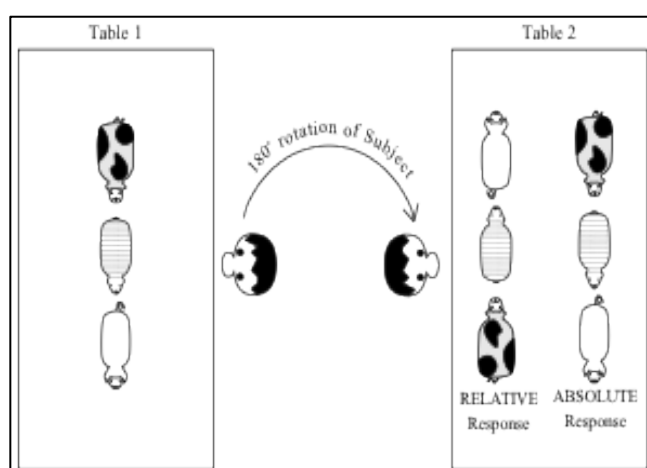


Figure 1: Animals-in-a-Row Task (from Levinson, 2003: 156)

The way in which the subjects put down the animals provides a cue towards which FoR has been used to remember the spatial arrangement observed. If participants use a relative FoR, the direction of the animals would stay the same as in the way they were seen, that is, either to the subject's own left or right. If participants used an absolute FoR, the direction of the animals would stay the same relative to some landmark or cardinal point, but not to the subject's left or right (see Figure 1). The stimulus involves only visual perception and the response only motor activity. Between the exposure to the stimulus situation and the response some coding of spatial relationships by means of a FoR in non-perceptual memory is involved. The nature of this coding is exactly the target of the task.

Data Collected.

All the 15 scholars³⁶ who belong to the research group administered the space task to a sample of the local community they investigated. Each scholar designed the sample based minimally on the following parameters: gender, age, kinship, education, activity/job, and social status. The average composition of the sample is 25 individuals, with a range of 10-43. In Table 1, I present the distribution of the various samples by scholar, field site, and number of subject.

³⁶ One scholar has not yet reported about his findings and cannot be included in this work.

Table 1: Scholar, Field Site, and Size of Sample

Scholar	Field Site	Sample
Giovanni Bennardo	Tonga	27
Leandro Mahalem de Lima ³⁷	Brazil	32
Victor de Munck	Lithuania	43
John Gatewood	Pennsylvania, US	13
Eric Jones	Peru	22
Stephen Lyon/ Zeb Aurang	Pakistan	10
Justus Ogembo	Kenya	18
Anna Paimi/Elisa Bellato	Italy	28
Hidetada Shimizu	Japan	19
Thomas Widlok	Namibia	25
Katharine Wiegele	Philippines	36
Wenyi Zhang	China	31
	Average	25

Few scholars are planning to increase the size of their sample in planned future visits to their field site.

Results of the Administrations of the Tasks.

The task was submitted 5 times to each participant/subject. Thus, in addition for each response to be coded as either Relative (Rel) or Absolute (Abs), each subject can also be coded as an absolute or relative coder once s/he uses three or more times the same FoR. It is insightful, first, to see what type of preference is shown by all the responses in each sample. In Table 2, I introduce the total responses for each field site and the distribution of those responses according the use of the Abs FoR or the Rel FoR. Then, I look at what type of preference is elicited for the sample by considering subjects with a minimum of 3 responses out of 5 (or 4 responses out of 5) as either Abs or Rel coder. Since 3 out of 5 same responses represents only 60% of responses of one type (a statistically low preference), I decided also to look at 4 out of 5 same responses because this result represents 80% of responses of one type (a statistically high preference) for each subject.

³⁷ This scholar did not participate in the workshop and conducted his field work in June-July 2015.

Table 2: Preferences for the Absolute FoR by Responses and by Subjects

Field Site	Responses			Subjects			
	Subjects	#	Abs FoR	Abs 3/5	Code 1	Abs 4/5	Code 2
Tonga	27	135	65/48%	54%	Mixed	33%	Rel
Brazil	32	160	103/64%	81%	High Abs	89%	High Abs
Lithuania	43	215	153/71%	72%	Abs	79%	High Abs
Pennsylvania, US	13	65	45/69%	69%	Abs	73%	Abs
Peru	22	110	71/65%	77%	High Abs	91%	High Abs
Pakistan	10	50	27/54%	50%	Mixed	62%	Low Abs
Kenya	18	90	65/72%	100%	High Abs	100%	High Abs
Italy	28	140	79/56%	61%	Low Abs	64%	Abs
Japan	19	95	25/26%	28%	Rel	16%	High Rel
Namibia	25	125	85/68%	84%	High Abs	90%	High Abs
Philippines	37	185	112/60%	61%	Low Abs	72%	Abs
China	31	155	87/56%	65%	Abs	63%	Abs
Average	25	127	76//60%	67%	75%/Abs	69%	83%/Abs

Looking at three of the results introduced in Table 2—columns: Abs FoR; Subjects/Abs 3/5; and Subjects/Abs 4/5, that is, % of Abs responses, % of Abs in 3 out of 5 subjects, and % of Abs in 4 out of 5 subjects—I was able to code (see the 2 columns under Subjects, that I titled Code 1 and Code 2) the various cultures using the following key: 45-54%= Mixed; 55-62% = low Abs/Rel; 63-74% = Abs/Rel; 75-100% = high Abs/Rel. The ranges for the coding were generated by the distribution of the percentages present in the results. The average for all the field sites is 67%, that is, an overall good preference for the use of the Abs FoR.

The coding of the communities/cultures has this frequency distribution: 4 High Abs; 3 Abs; 2 Low Abs; 2 Mixed; and 1 Rel. It is apparent that the three different types of Abs preferences—high, normal, and low—represent the majority of the recorded types of preferences across the various sites (9/12, that is, 75%). The size of the communities investigated and the nature of the activities the subjects engage in—primary food production—may lead one to speculate that it is the extensive and daily contact with the outdoor that might have produced such a generalized preference (see Pederson, 1993, for an early detection of this phenomenon). In other words, it might be the nature of the communities chosen that produces such a results.

Leaving this speculative realm, what emerges from the results is that no communities is exclusively using one FoR over the other. On the contrary, since both FoRs are cognitively possible and linguistically expressible in all the communities, the subjects actively choose to use them both during the performing of the tasks. Relevantly, there is for sure a detectable overall preference for the Abs FoR. However, in one community/culture (Japan) the Rel FoR is the preferred one and in another two communities the Rel FoR is used almost as much as the Abs FoR (Mixed) with no detectable statistical preference (see in Table 2 results for Pakistan and Tonga). Significantly, the 2 Mixed results move toward a clearer preference once the responses to code a subject as Abs/Rel is raised to 4 responses out of 5. In fact, Pakistan shows a Low Abs FoR preference and Tonga shifts to a Rel FoR preference.

All the other results become stronger in their already detected preference once one compares the results for 4 responses out of 5 with those of 3 responses out of 5. In fact, the new coding has this frequency distribution: 5 High Abs; 4 Abs; 1 Low Abs; 1 Rel; and 1 Low Rel. Again, it is apparent that the three different types of Abs preferences—high, normal, and low—represent a majority, this time higher, of the recorded types of preferences (10/12, that is, 83%; see Table 2).

Conclusion.

The generalized use of both FoRs observed deserves a closer attention in the next phase of the research. At the same time, it could already indicate that the CMs of Nature that will be found will very likely reflect such a double possibility. So, it is also conceivable that the CMs will show features that may reflect a dual approach (two types of CMs) to the local explanation of Nature and the relationships among its internal components. For example, the co-presence of a holistic approach and of one in which nature is separated from humans with a focus on these latter (see Introduction in this Volume).

If this were to correspond to the cognitive, individual and collective, organization of knowledge in the communities investigated, this phenomenon should also be picked up by the administration of a consensus analysis in those same communities. In fact, we expect the results of the consensus analysis—planned for the second phase of the research project—to indicate the presence of two CMs both intra-individually and across the communities to which they belong. The strength of the presence of one (e.g., holistic) over the other (e.g., focus on humans) may vary and dovetail with the results—preference for Abs FoR or Rel FoR—of the space tasks administered. Thus, a strong correlation between preferences for space and molar cognitive organizations such as CMs would find some supporting evidence.

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