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Causality in a Tongan Cultural Models of Nature

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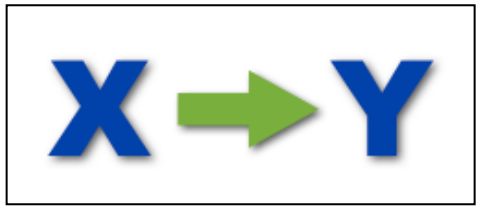
tó ‘a e ‘ufi (‘i) he mahina katoa
“plant yams with full moon”
pianta i yam con la luna piena

koe’uhi
“because”
poiché

ko e ‘ufi ma’u (‘a) e ivi mei ia
“yams get force from it”
i yam ne prendono forza



We could represent this little piece of Causality with a **Causal Graph**

X ---> Y

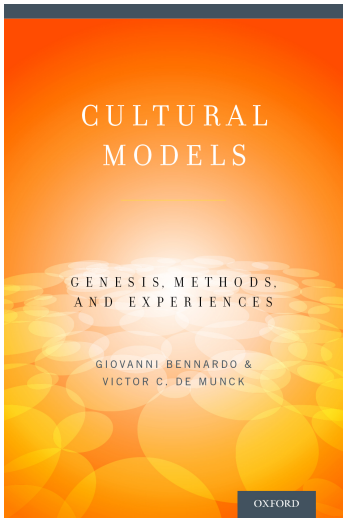
Causal Graphs are part of **Causal Models**

Causal Models are part of **Cultural Models**

What is a *Cultural Model*?

What is a *Causal Model*?

What is a *Causal Graph*?



Cultural Models are

Assemblages of Mental Knowledge

(i.e., Representations of the World)

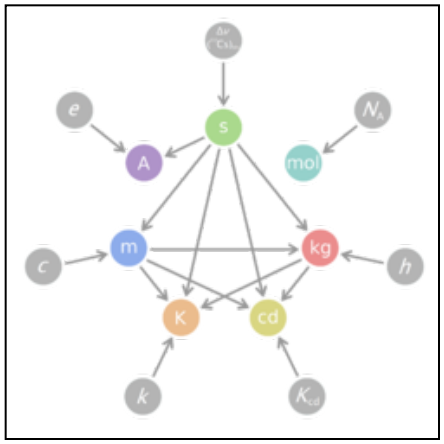
shared within a community

Cultural Models function as mental lenses used

in *understanding*, in *reasoning*,

in *planning actions*,

and they may *motivate/generate action* as well



Cultural Models are systems.
That is, they are constituted by:

- **Units** (e.g., concepts, cultural model, etc.); and
- **Relationships** among these units.

Relationships among units can be of different types.
For example:

- **Sequential**
- **Taxonomic** (also Partonomic)
- **Causal**

Causality and Cultural Models (or Schemas)

Then, Causality is 'Part and Parcel' of Cultural Models

"… [O]ur ability to infer cause from event co-occurrence seems to depend heavily on higher-level beliefs about what sorts of events can cause others, on beliefs about how events interact mechanistically, and on pragmatic pressures concerning what needs to be explained" (Rips, 2011: 150).

"Identifying causes requires a healthy dose of theory to direct our search. We can't understand these abstract matters unless the appropriate schemas are already in place" (Rips, 2011: 123).

One way in which causality is described and explained
is by the use of **Causal Models**

Now, I briefly

- Introduce Causal Models
- Introduce a research project about Cultural Models of Nature
- Propose three Causal Models in three CMs of Nature

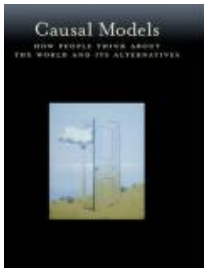
Causality as Representation

"[T]**he invariant** that guides human reasoning and learning about events is causal structure. **Causal relations hold across space, time, and individuals**; therefore, the logic of causality is the best guide to prediction, explanation, and action. And not only is it the best guide around; it is the guide that people use. People are designed to learn and to reason with causal models" [my bold and underlining] (Sloman, 2009: 20).

What is a Cause?

"A causal relation suggests a mechanism unfolding over time … so the notion of cause involves change over time … One general temporal constraint on causation is that effects cannot precede their causes." (2009: 21)

"… [C]ausal relations relate entities that exist in and therefore are bounded in time. I will refer to such entities as *events* or *classes of events* … Causal relations … associate events with other events" [original italics] (ib.: 22).



A Causal Model

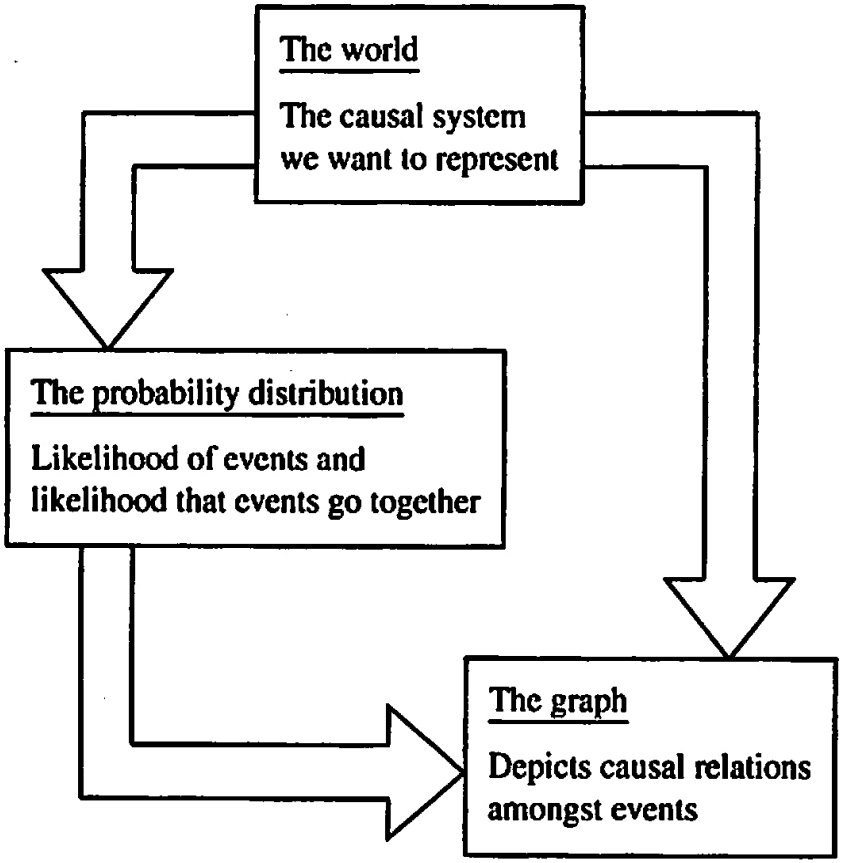


Figure 4.1

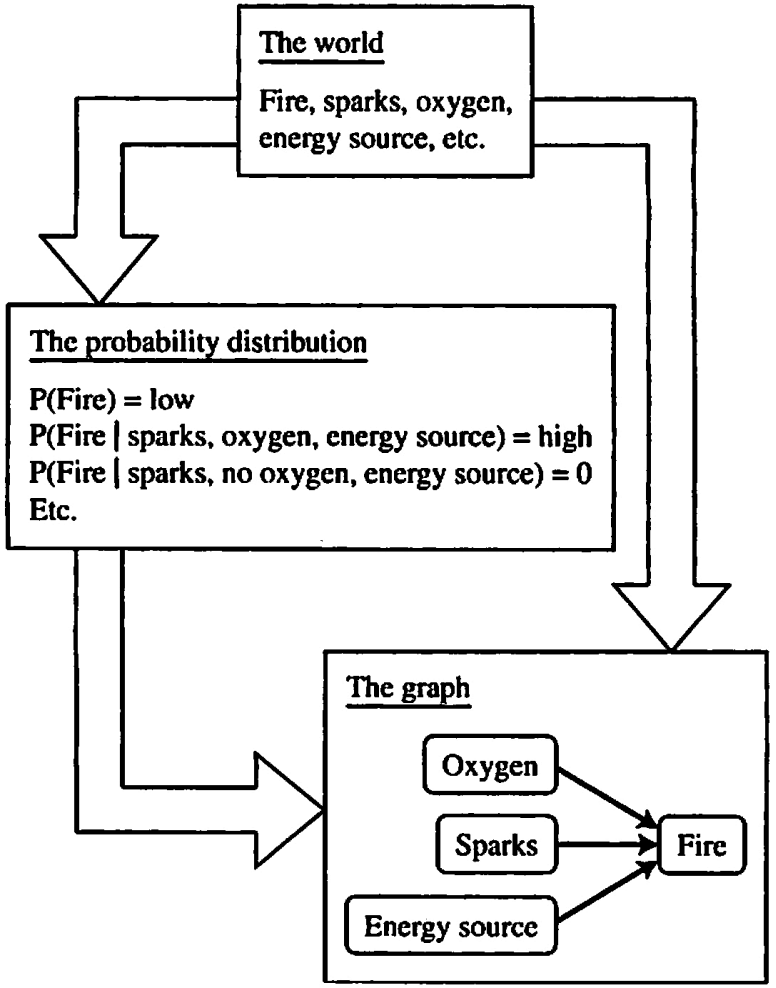


Figure 4.2

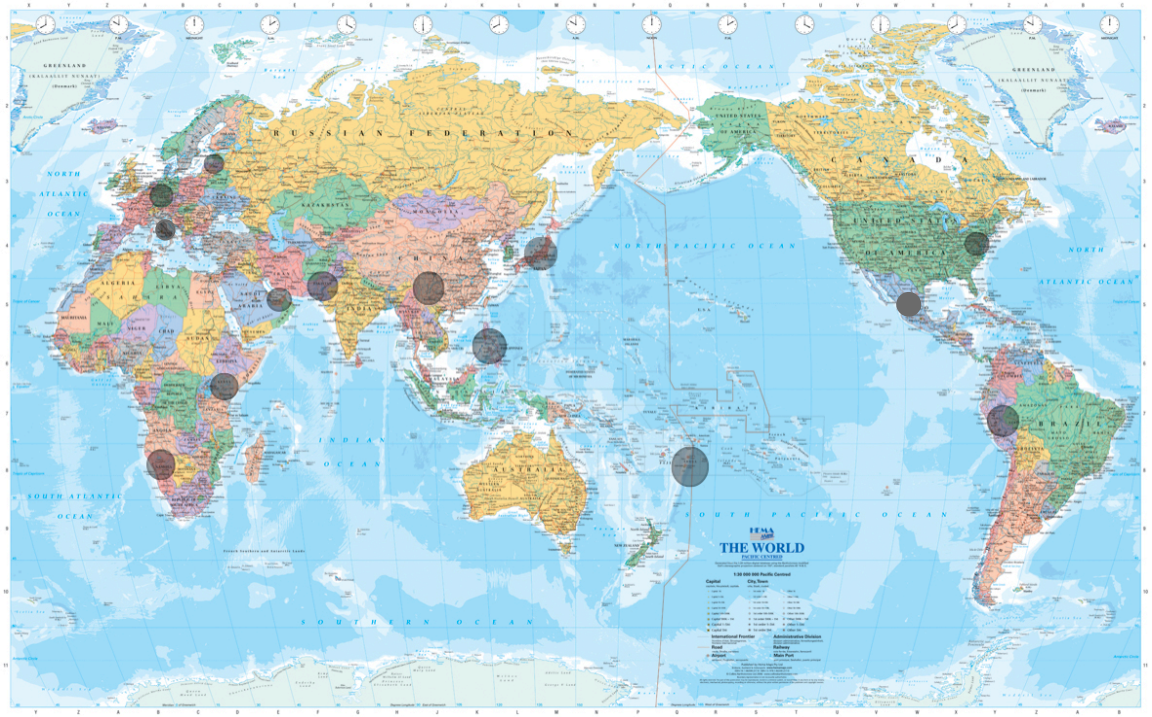
Causal Models in Cognition

Causal Models are suggested to play a role in:

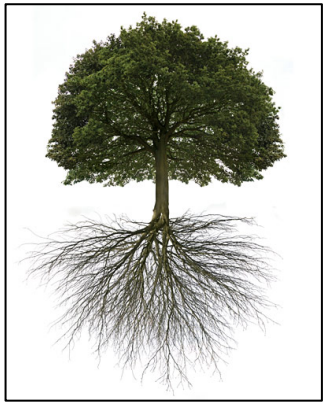
- Reasoning
- Decision making
- Judgments
- Conceptual Structure
- Categorical Induction
- Language
- Learning

Causal Models in Cultural Models of Nature

I am currently working with a group of scholars on a research project, sponsored by the National Science Foundation, USA, in which we intend to discover the cultural models of nature held by members of 12 communities of primary food producers located in 6 continents.



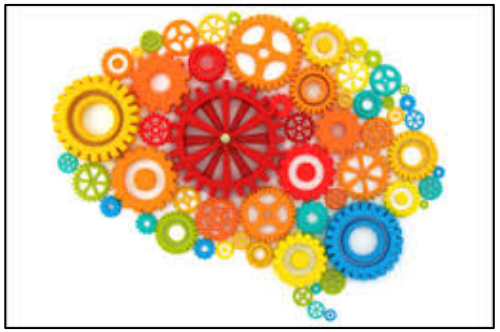
We have prepared a methodological protocol that will be used by all of us to collect and analyze data (Bennardo, 2012).



ROOTS

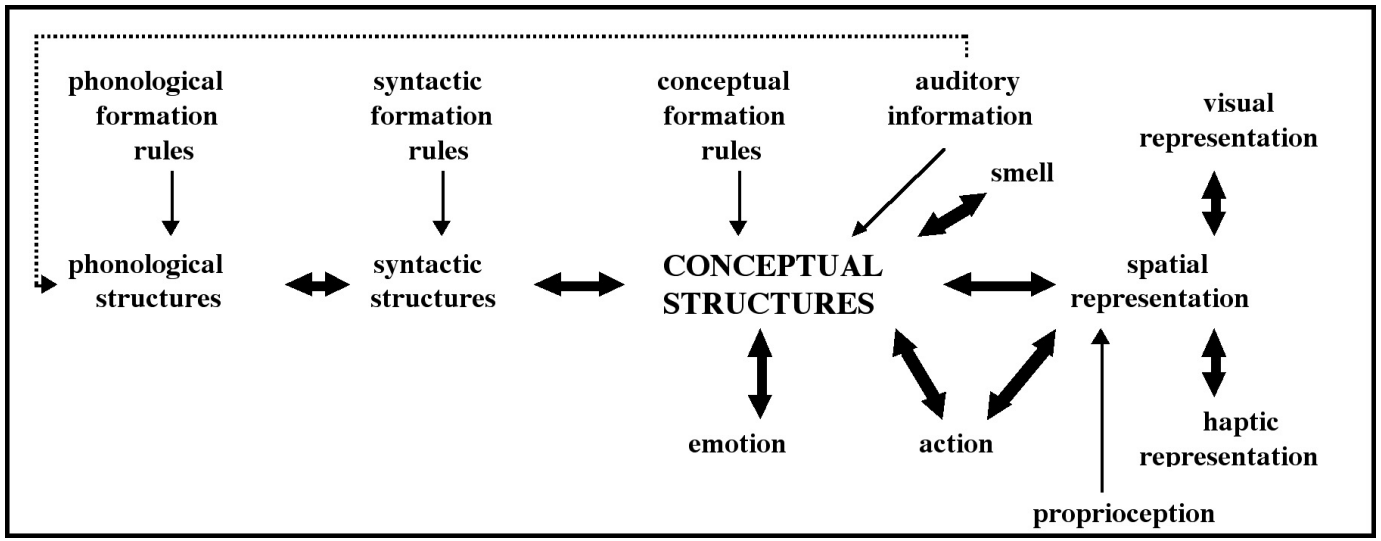
The NSF supported project entitled
Cultural Models of Nature Across Cultures
is rooted in the following areas of research:

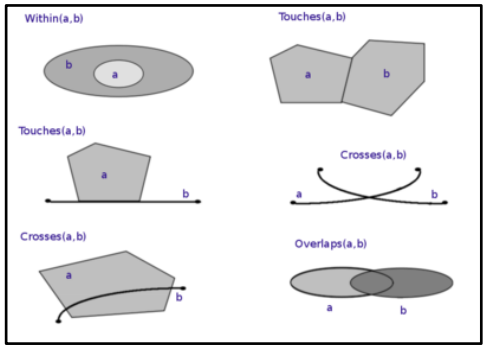
1. Mental Architecture
2. Spatial Relationships
3. Cultural Models
4. Climate Change
5. Indigenous Knowledge (IK and/or TEK)
6. Policy Making



1. Mental Architecture

Among the many existing proposals for mental architecture,
I adopted the one suggested by Jackendoff (2002, 2007).
His proposal is relevant to the project because
it suggests a mental module for '*spatial representations*'
separate from the central '*conceptual structures*' module.

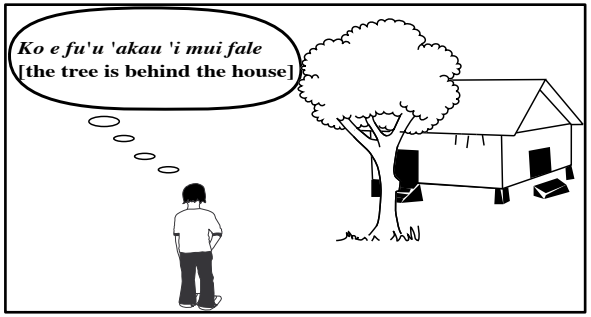




2. Spatial Relationships

The content of the *spatial relationships* module has been extensively studied and a fundamental part of such content is the concept of Frame of Reference (FoR) (Levinson, 2003; Bennardo, 2009).

A FoR is a set of coordinates that generates an oriented space within which relationships between objects are established. There are three types of FoR that typically share the vertical axis and differ on the horizontal plane. They are: the *relative* FoR, the *intrinsic* For, and the *absolute* FoR.



Types of Frames of Reference

A ***relative*** FoR is centered on a speaker (left-right and front-back axis) and it remains centered on the speaker when the speaker moves,
e.g., "The ball is in front of me."

An ***intrinsic*** FoR is centered on an object and it remains centered on the object when the speaker moves,
e.g., "The ball is in front of the car."

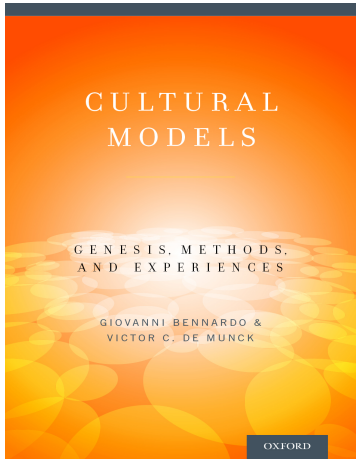
An ***absolute*** FoR uses conventionalized and fixed points of reference within a speaker's spatial field,
e.g., north, south, east, west, as in "The town is south of the river."

Spatial Relationships and Cognition

The content of the spatial relationships module has been widely proposed as being foundational to the development of both language and cognition

Clark (2011); Talmy (2000); Mandler (2004, 2008); Mix, Smith, and Gasser (2010); Schubert and Maas (2011); Tversky (2011); Landau and Hoffman (2012)

It is for this reason that we propose that
preferences in representing spatial relationships (FoR)
will be replicated in other domains of knowledge (see Bennardo, 2009),
insofar as spatial relationships contribute substantially to the development of cognition.



3. Cultural Models

Knowledge is mentally organized in models (Johnson-Laird, 1983, 1999)
whose contents are often significantly shared within communities.
This latter type of models have been called ***Cultural Models***
(Holland and Quinn, 1987; D'Andrade and Strauss, 1992; Quinn, 2005;
Bennardo and De Munck, 2014).

Then, considering the suggestions
from the research on spatial relationships,
it is plausible to hypothesize that
preferred representations of spatial relationships
might play a constructive role
in the generation of cultural models within one's mind and community.

4. Climate Change

Climate change is one of the most challenging issues that we are collectively facing insofar as it threatens the survival of our species.
It is without doubt that before long extensive action,
beyond those initiated over the past two decades, will have to be implemented worldwide to try to minimize its potential and disastrous effects.

The populations 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 kinds of populations:
e.g., farmers, fishermen, or herders.

The whole world population is at risk and we all will be obliged to change our behavior to make our presence on the planet sustainable (see Moran, 2006, 2010).
However, the daily and close contact with the environment by primary food producers makes them most directly affected by the effects of climate change.
Besides, they are the primary actors who will likely implement whatever new and/or radical remedial policies are proposed.

5. Indigenous Knowledge (IK and/or TEK)

The policies to respond to climate change stressors may be
locally generated as a community response to local environmental degradation
or they may be suggested and imposed nationally or internationally
by political and economic bodies whose knowledge of local realities,
including Indigenous Knowledge (IK)
and Traditional Environmental Knowledge (TEK),
is typically lacking, insufficient or worse, disregarded.

(Kempton, 2001; Theodossopoulos, 2003; Medin, Ross, and Cox, 2006;
Medin, Ross, Cox, and Atran, 2007; Lauer and Aswani, 2009;
Guneratne, 2010; Metz, 2010)

6. Policy Making

Acquiring knowledge about IK and TEK
would contribute to the construction of policies
(devised to face environmental stressors linked to climate change)
sounder in their content,
easier to be accepted by local population,
and eventually implemented with the urgency and passion
needed to remedy the current situation.

(for examples of successful projects see
Appiah-Opoku, 2005; Wallace, 2006;
Casimir, 2008; and Vayda, 2009)

Cultural Models of Nature in Primary Food Producers

A fundamental part of any IK or TEK is a ***cultural model of nature*** that generates behavior, that is, specific responses to environmental stressors such as climate change.

As already stated, the populations most exposed to the direct impact of climate change stressors are primary food producers whose lives (and not only theirs) depend on direct contacts with natural environments.

Thus, one of the major foci of our current research is
on communities of primary food producers.
The research aims at discovering their cultural models of nature.
At the same time, it aims at discovering preferred modality
of mentally representing spatial relationships
so that a possible correlations of such modalities
with specific types of cultural models of nature
could also be discovered.

Participants

PI. Giovanni Bennardo, Anthropology, Northern Illinois University (Kingdom of Tonga and Italy)

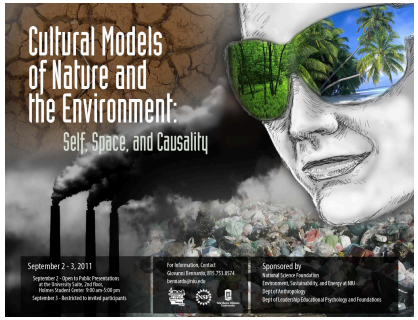
CoPI. Andrea Bender, Psychology, University of Freiburg, Germany (Germany)
CoPI. James Boster, Anthropology, University of Connecticut (Amazonia, Peru)
CoPI. Victor DeMunck, Anthropology, SUNY, La Paltz (Lithuania)
CoPI. John Gatewood, Anthropology, Lehigh University (Pennsylvania, US)
CoPI. Eric Jones, Anthropology, University of Texas, Houston, (Ecuador)
CoPI. Stephen Lyons, Anthropology, Durham University, United Kingdom (Pakistan)
CoPI. Justus Ogembo, Anthropology, University of New Hampshire (Kenya)
CoPI. Anna Maria Paini, Anthropology, University of Verona, Italy (Italy)
CoPI. Hidetada Shimizu, Educational Psychology, Northern Illinois University (Japan)
CoPI. Thomas Widlok, Anthropology, University of Cologne, Germany (Namibia)
CoPI. Katharine Wiegele, Anthropology, Northern Illinois University (Philippines)
CoPI Senior Personnel, Fadwa El Guindi, Qatar National Research Fund, Qatar Foundation (Qatar)
CoPI, Wenyi Zhang, Anthropology, Sun Yat-Sen University, Guangzhou, China (China)
Research Assistant, Elisa Bellato, Anthropology, University of Verona, Italy (Italy)

Doctoral Student, Zeb Aurang, Anthropology, at University of Durham, UK (Pakistan)
Doctoral Student, Psychology, at University of Freiburg, Germany (Germany)
Doctoral Student, Anthropology, at University of Cologne, Germany (Namibia)
Doctoral Student, Social Sciences, at Qatar University (Qatar)
Master Student, Anthropology, at Northern Illinois University, (Tonga)
Master Student, Anthropology, at Northern Illinois University, (Philippines)

Field Sites Characteristics

Table 1. Field Sites and Broad Sources for Variation in Cultural Models.

Site	Settlement Pattern	Major Productive Activities	Notable Environmental Changes
Tonga	Small coastal village	Horticulture, fishing, gathering	Rising sea water; decreased fish availability
Germany	Two river valley villages	Perennial fruits	Temperature increases; flooding; plant diseases
Peru	Small riverine foothills settlements	Horticulture	Land desiccation; decreased game availability; decreased crop varieties
Lithuania	Small city in hills	Small-scale agriculture and dairy; gardens;	More extreme seasons; flooding; increased temperatures
United States	Rural river valley	Industrial and small-scale agriculture and dairy	Flooding; increased temperatures; erratic weather
Ecuador	Rural mountainside	Small-scale agriculture	Reduced glaciation; greater aridity; change in crops produced (less native)
Pakistan	Small village in hills	Irrigated and non-irrigated agriculture	Reduced groundwater; erosion
Kenya	Fertile highlands village	Small-scale agriculture	Desertification; changing weather patterns
Italy	Small mountain village	Gardens; pastures	Increased temperature; reforestation
Japan	Village on hillside	Yams; plums	Weather extremes
Namibia	Rural desert	Hunting; gathering; cattle; farm labor	Reduced forage; aridity/drought
Philippines	Two coastal villages	Fishing	Decreased fish availability; reef damage; reduced fish nursery habitat
Qatar	Desert cities	Wage labor	Rapid urbanization, but continued kin focus
China	Five mountain villages	Hunting; gathering; forestry; livestock; horticulture; small-scale agriculture	Drought; more commercial crops



Common Methodology

During an NSF sponsored workshop held at Northern Illinois University
on September 1-4, 2011 and entitled
Cultural Models of Nature and the Environment: Self, Space, and Causality,
we agreed on a common methodology for the research project
which includes qualitative and quantitative strategies.

<u>Data Acquisition Methods</u> include:
Participant Observation, Nature Walks,
Open-Ended Interviews, Semi-Structured Interviews, Questionnaires,
Space Tasks, Free Listings, Pile Sorts, Frame Elicitations,
Memory Tasks, Drawing Tasks, Rating Tasks.

<u>Analysis Strategies</u> include:
Key Words, Semantic Roles, Metaphors, Gist, Reasoning,
Frequency, Correlation, MDS (Multidimensional Scale), Clustering,
Network Analysis, Consensus Analysis.

Status of Data Acquisition and Analysis

- All researchers finished the first data acquisition in the field and they are currently at their home institutions analyzing data;
- All researchers will participate in a 3-day workshop to be held here in Verona on March 11-14;
- All researchers will be going to the field again in summer 2016 to complete the data acquisition.

Causal Models in Cultural Models of Nature

As a way of closing this presentation,
I am introducing three 'hypotheses' of causal models
that structure cultural models of nature.
In other words,
I suggest that cultural models of nature*
may include one of these
three different types of causal models.

*Examples of cultural models of nature are taken from
Kempton, Boster, and Hartley (1995),
Selin (2003), and Atran and Medin (2008).

Causal Model of Nature 1

World

Humans
Animals
Plants
Physical Environment
Weather
Supernatural

The Probability Distribution:
P(nature) = high
P(nature | humans, animals) = low
P(nature | supernatural, humans, animals) = medium
P(nature | supernatural, humans, animals, plants) = high
P(nature | supernatural, humans, animals, no plants) = 0
P(nature | supernatural, humans, no animals, plants) = 0
Etc.

The Graph

Humans
Animals
Plants
Physical Environment
Weather
Supernatural

NATURE

Causal Model of Nature 2

World

Humans
Animals
Plants
Physical Environment
Weather
Supernatural

The Probability Distribution:
P(nature) = low
P(nature | supernatural) = high
P(nature | no supernatural, humans) = 0
P(nature | no supernatural, humans, animals) = 0
Etc.

The Graph

Supernatural → Humans, Animals, Plants, Physical Environment, Weather

NATURE

Causal Model of Nature 3

World

Humans
Animals
Plants
Physical Environment
Weather
Supernatural

The Probability Distribution:
P(nature) = low
P(nature | supernatural) = high
P(nature | supernatural, humans) = high
P(nature | no supernatural, humans) = 0
P(nature | supernatural, no humans) = 0
P(nature | supernatural, humans, animals) = high
Etc.

The Graph

Humans

Supernatural

Animals
Plants
Physical Environment
Weather

NATURE

These are only three out of many possibilities

At the ‘probability distribution’ level
culture plays a very important role

Soon, we hope to be able to fill in
some of the missing data
and consequent models
(both cultural and causal)

THANK YOU!