



# Do natural hazards transform culture?

Carol R. Ember

Presented on May 4, 2015, Santa Fe Institute, New Mexico  
as part of the workshop “Toward Concordance in  
Macrohistorical Data Working Group” (Peter N. Peregrine,  
organizer)

## Our interdisciplinary team

### Cultural anthropologists

Teferi Abate Adem  
Carol Ember  
Eric Jones  
Ian Skoggard

### Archaeologist

Peter Peregrine

### Psychologist

Michele Gelfand

### Climatologist

Benjamin Felzer

Research supported by a 4-year interdisciplinary (IBSS) NSF grant to HRAF



*Front row from left: Peter Peregrine, Carol Ember, Eric Jones and Ian Skoggard. Back row from left: Michele Gelfand, Ben Felzer, and Teferi Abate Adem.*



# Main research questions

- How have human cultural groups responded to and been transformed by climate hazards, particularly those with the potential to seriously destroy food supplies?
- How does variation in frequency, severity and predictability of hazards affect the nature of those societal transformations, across time and space?

# Cultural Transformations?

Are there similar responses to unpredictable environments?

Research questions			Basic assumptions	
	Comparative strategies	Previous findings	“Tight” or “loose” cultures	Subsistence diversity
Breadth of social networks	Land Access/ Sharing and cooperation	Type of political system		Control Variables

# Concentrating on natural hazards affecting food supply

## Flooding



## Droughts



Also hurricanes (cyclones), killing frosts, insect infestations



# Basic assumptions

- Unpredictable natural hazards may be increasing with climate change, but they are not new
- We presume that societies surviving in unpredictable hazard-prone environments developed a suite of adaptive traits for those environments
- If so, we should find differences when we compare societies living in less versus more predictable environments
- Those differences are strong candidates for being adaptive traits



# Overall Plan

- Test theories derived from different disciplines
- Employ **three types of worldwide comparison** using different types of societal/cultural units in different time frames
- Use some precoded variables, but code many additional domains
- **Get climate data close to community or geographic focus as much as possible**



## Type of comparison

- **Ethnographic**
  - **Using the 186 society Standard Cross-Cultural Sample; most of the societies are now in *eHRAF World Cultures***
- **Prehistoric diachronic comparisons of archaeological traditions**
  - **Using *eHRAF Archaeology*, supplemented by other archaeological site reports**
- **Cross-country comparisons**





# Previous findings

- Violence
- “Tight” versus “loose” cultures
- Corporate versus exclusionary political economies



# Violence

- **Unpredictable climate-related hazards predict more violence**

**Ethnographic comparisons**—more warfare in unpacified, nonstate societies (Ember and Ember 1992; Ember et al. 2013)

**Prehistoric comparisons**—Lambert (1997) in southern California; Lekson (2002) in the U.S. Southwest

**Historical studies**--Kang (2000) in Korea; Zhang et al. (2007) in China

**Meta-analysis of 60 diachronic studies** found all kinds of violence predicted by more climate unpredictability--Hsiang et al. (2013)

From Lekson.  
2002. War in the  
Southwest, war  
in the world.  
*American  
Antiquity, 64  
(4): 615.*

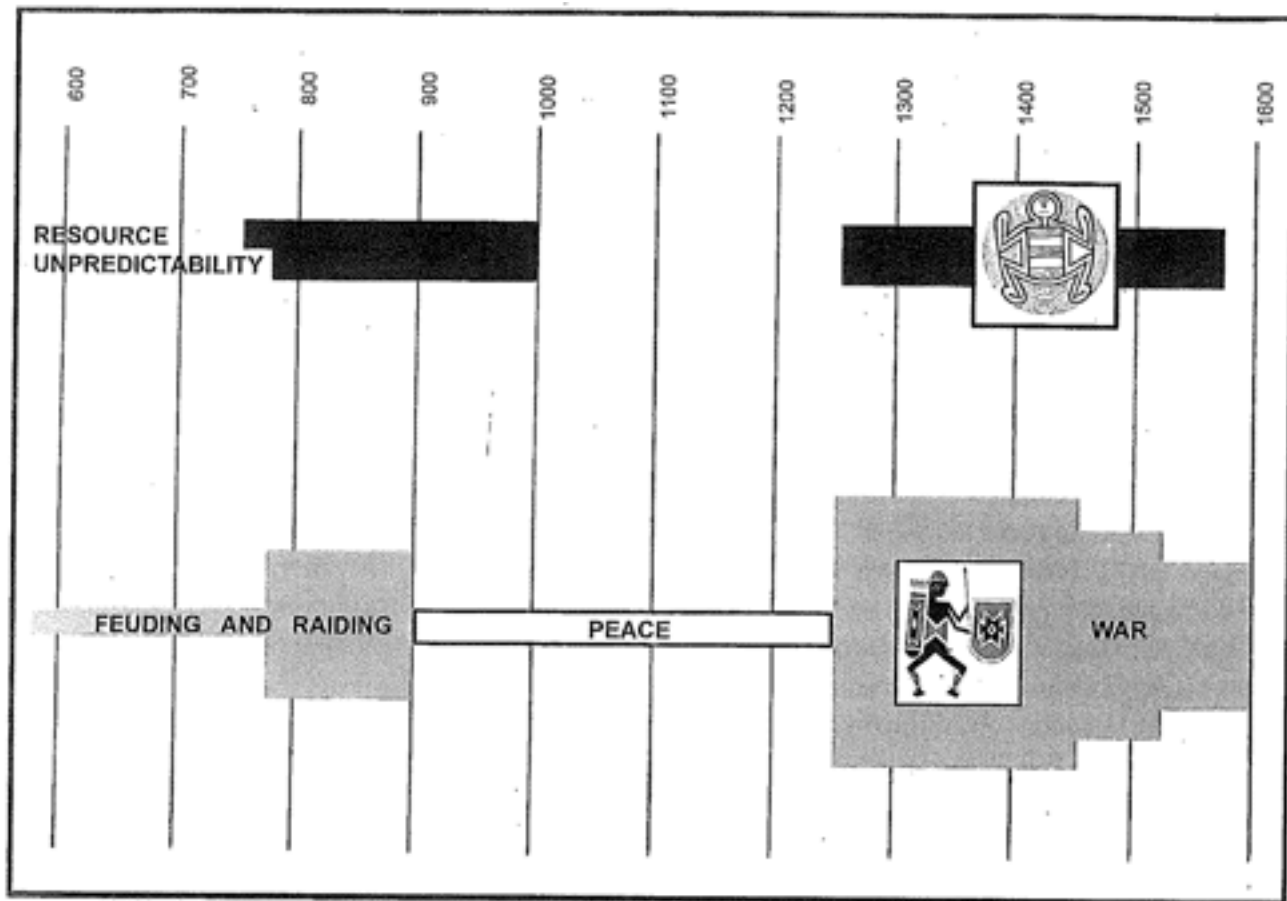


Figure 2. Schematic chronologies of resource unpredictability and violence. Periodization of resource unpredictability modified from Dean (1988, 1996); of raiding/feuding and warfare modified from LeBlanc (1999). See text for details. Note the approximate coincidence of periods of violence and periods of resource unpredictability and escalation of violence from raiding/feuding (early) to warfare (late).

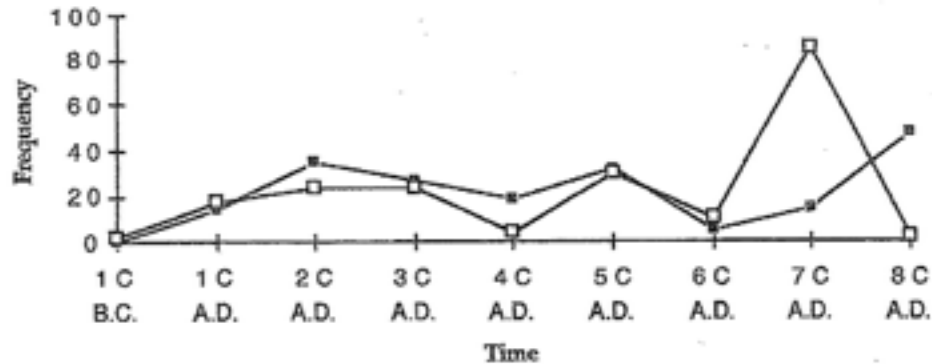


Figure 3. Filled squares are sums of number of environmental stresses; open squares are number of wars; summed across centuries

From: Kang, B. W. 2000 A reconsideration of population pressure and warfare: A protohistoric Korean case. *Current anthropology*, 41(5), 873-881.

## “Tight” versus “Loose” cultures

- Original concept came from anthropologist Pertti Pelto (1968).
- “tight” vs. “loose” refers to the degree to which **social norms are pervasive, clearly defined, and reliably imposed** (Gelfand et al. 2011)
- Research on 33 countries (Gelfand et al. 2011) and the 50 U.S. states (Harrington and Gelfand 2014)
- “Tight” countries and “tight” states
  - had significantly more climate-related disasters
  - “Tight” countries had significantly more violence



# **Corporate versus exclusionary polities**

- In a small exploratory sample, exclusionary societies were associated with hazards that destroy food (Peregrine and Ember, in press)



# Subsistence Diversity

- Monocropping is considered by development agencies to be poor practice.
- No cultures have monocropping, but some have much greater diversification than others.
- We expect people living in unpredictable environments to have developed
  - A broader range of subsistence activities
  - Greater diversity of foods collected, hunted or produced
  - Greater use of diverse niches
  - Explicit contingency plans for disasters, including elaborated food storage systems, lending out animals, fostering out children, etc.



# Broader networks

- In the absence of broader intervention by governments, people faced with disasters should try to increase the size of the social network they can turn to in times of trouble. We expect to find in more unpredictable environments
  - Deeper and broader networks based on
    - kinship
    - cross-cutting ties such as age-sets
    - ritualized dyadic friendships
    - trading and alliance partnerships
  - Networks and bonds reinforced by regular rituals and ceremonies





# Land/Sharing/Cooperation

- more **elaborated** food storage
- more **food sharing** and **cooperative labor**
- more **communal property** including **secure access** to return even if have to leave for some period of time

# Political system

<i>Differences</i>	<i>Corporate</i>	<i>Exclusionary</i>
<i>Resources</i>	<i>largely from populace</i>	<i>leader controlled</i> <ul style="list-style-type: none"><li>• <i>outside trade</i></li><li>• <i>leader-owned</i></li></ul>
<i>Leader differentiation</i>	<i>low to moderate</i>	<i>moderate to high</i>
<i>Public goods</i>	<i>considerable</i>	<i>few</i>
<i>Ideological system</i>	<i>cosmological order</i>	<i>filial and family ties</i>



# Control Variables

We know that we will need to control on a number of factors including:

- Subsistence strategies
- Settlement patterns
- Scale and complexity of society

# Examples of coding underway

Typical family diet will be used to estimate diet diversity

- excludes societies mostly buying food

<b>Diet Item</b>	<b>Frequency Eaten</b> 1-Rare (0-10%) 2-Sometimes(10-40) 3-Frequent (40-70) 4-Very Frequent (70-90) 5-Daily (90-100)	<b>Importance</b> 1-Complement 2-Secondary 3-Primary	<b>Commercially obtained or Bartered for</b>	<b>Seasonal?</b>



# **Additional food/diet items**

## **FOOD CONSUMPTION**

### **Frequency and regularity of meals**

- variation by age
- variation by gender
- variation by status

### **Allowance of between meal eating**

- who is allowed to “snack”?

### **Who regularly eats together?**

- type and size of unit eating together
- if family does not all eat together, who eats together (gender, age, etc.)



# **Food consumption (cont.)**

**Differences in access to types of food and quantity of food**

- by gender
- by age
- by status (e.g., class, leadership)

**Customs of hiding food or eating alone**

**Customary periods of fasting**

**Special foods for emergencies or famines**

- plant foods
- animal foods

**Changes in eating practices reported with emergencies or famine**

- reduced number of meals?
- reduced food at meals?
- hiding of food or eating alone?
- other (explain)



# Codes to use from SCCS

## for Tightness vs. Looseness

### **Strictness of Childhood socialization**

### **Number and strictness of rules governing sexuality**

- premarital sex
- extramarital sex
- rape

### **Number and strictness of rules governing reproduction**

- menstrual taboos
- pregnancy restrictions
- birth restrictions
- marital intercourse
- contraception

### **Separation of genders**

- males and females generally
- husbands and wives
- at adolescence

### **Marriage and divorce**

- degree of choice in marriage
- degree of choice in divorce

### **Flexibility of socio-political system**

- degree of hierarchy
- degree of participation

### **Compliance and punishment involving community norms**

### **Cohesion and loyalty to community and society**

### **Contacts with outside groups**



# Additional domains to code

## For tightness/looseness

### **Clothing and Adornment**

- To what extent is clothing standardized?
- Expression of individuality in clothing
- Expression of individuality in body adornment/alteration

### **Emotion and Interpersonal Relationships**

- Do interpersonal relationships involve physical contact?
- Are individuals encouraged to repress emotion?

### **Settlement and Dwelling Patterns**

- **Are houses built on standard pattern?**
- **Any room for individual expression?**
- **Does the settlement have a unified pattern? What is it?**





# Additional domains to code

For tightness/looseness (cont.)

## Art

- To what extent are there rules for artistic (visual art, music, dance) expression? How much room is there for individual expression?
- Are there sanctions against certain forms of artistic expression?
- Do certain types of music or drama require synchrony

## Letting go

- Are there regulated times for relaxing and “acting out”?
- To what extent are recreational drugs/alcohol consumed for relaxation purposes?



# Caveats to predictions

- We expect that societies relying on nomadism will need more flexible personalities, so “tightness” may be maladaptive in such societies
- More complex societies may follow a strategy of excluding some individuals (e.g., lower strata) from resources rather than practicing widespread sharing



# Additional questions on disasters

- Do the previous measures (Ember and Ember 1992) of natural hazards (in a 25-year period around the ethnographic present [EP] match the data from climatology?
- This is important because Ember and Ember found that threat of (but no actual disasters) in the 25 year period predicted warfare just as well as one or more actual disasters.
- How often do disasters have to occur for societies to transform their cultures? How serious do they have to be?



# Data Structures for Synchronic Comparisons based on ethnographic data

- **Focal Time:** all HRAF variables coded by the team are rated for -15 + 10 around the EP (ethnographic present) given by the SCCS sample.
- We are coding the SCCS cases in a **randomized order** starting with all cases (approximately 100) that we were able to code reliably on natural hazards that seriously destroy food supplies (Ember and Ember 1992).
- We use the **relational database Access**. This database includes forms for coders entry and possibilities for reporting outputs. The forms include the questions and have drop-down menus for the scale score choices. The databases are backed up in the cloud every 4 hours



# Data Structures for Synchronic Comparisons based on ethnographic data-2

- In all databases, our primary key is the **SCCS id**
- In addition to an “Orientation” Access database which includes the SCCS id, time focus (e.g., 1920), place focus (given in the SCCS) we have separate Access databases for each domain and/or subdomain.
- Have tried to create standardized file names for the following
  - coding scales—start with **CS** [CSP for preliminary; CSF for final]
  - coding notes—start with **CSHN**
  - code sheets—start with **CSH** [CSHP for preliminary; CSHF for final]
  - data files—start with **DT**
  - analysis output—start with **AN**



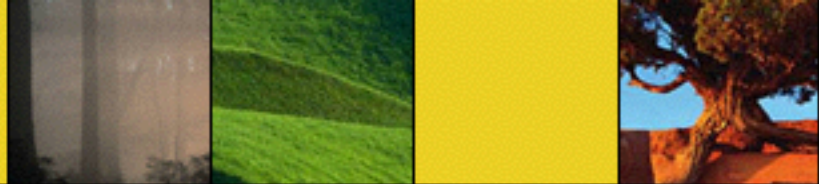
## Data Structures for Synchronic Comparisons based on ethnographic data-3

- Modify the file names with SCCS id and with domain
  - **CSHP-001-Land-[Coder Initials]**—for preliminary code sheet of SCCS case 1 with respect to land tenure
    - Resolved Codes get “Resolved” instead of coder initials
  - **CSHN-001-Land-[Coder Initials]**
    - Extracts from eHRAF World Cultures with citational information pertaining to a particular domain f
- **Text documents** saved in a **version control system** called **Subversion** which keeps the file names intact and stores dated revisions to allow retrieval of previous versions.



# Data Structures (cont.)

- **AN** or analysis output files are more complex to name and track because they usually are looking at more than one domain, but we try to put the domains in the title:
  - e.g. AN-Land-Resources-Complexity-[Analyst initials] for output analyzing land tenure variables, resource codes and complexity variables



## Climate Variables—

**Question 1**—Do they correspond to ethnographically-derived measures?

**Question 2**—Can we assess how long a time-depth influences cultural transformations? Is within a generation the most critical?

**Question 3**—How are the cultural transformation affected by predictability, constancy, and contingency (following Colwell).

**Question 4**—What do we do with multiple weather station data? What about missing data? What if data does not encompass the range around the EP?





# Issues with different units of analysis

- To match to ethnographic units to weather stations, we first looked for the SCCS latitude and longitude on maps in eHRAF to see if the location looked reasonable (sometimes we had to move location). Then we looked for weather stations within half a degree latitude—at the equator it is 111 km (correcting for distance from the equator) that encompassed the ethnographic present for as many years as possible; if we couldn't find a match we expanded to 222 km.
- In each weather station file, our climatologist colleague put the SCCS id in the file and did some preliminary computations of average the annual coefficient of variation, but we are still working on appropriate ways to have the data work together.
  - do we use the closest station?
  - do we average all the stations?



# Future directions

- Most of the societies in eHRAF have multiple time frames (in contrast to the SCCS which has one time and place focus)
  - diachronic analyses are future step
  - where possible, integrate archaeological data with ethnographic data to get a broader time line



# References

- Ember, Carol R., Teferi Abate Adem, Ian Skoggard, and Eric C. Jones. (2012) Livestock Raiding and Rainfall Variability in Northwest Kenya. *Civil Wars* 14: 159-181.
- Ember, Carol R., Teferi Abate Adem, and Ian Skoggard. 2013. Risk, uncertainty, and violence in eastern Africa: a cross-regional comparison. *Human Nature* 24: 33-58.
- Ember, Carol R., Ian Skoggard, Teferi Abate Adem & A.J.Faas. 2014. Rain and Raids Revisited: Disaggregating Ethnic Group Livestock Raiding in the Ethiopian-Kenyan Border Region, *Civil Wars*, 16:3, 300-327, DOI:10.1080/13698249.2014.966430
- Ember, Carol R. and Melvin Ember. 1992. Resource unpredictability, mistrust, and war: A cross-cultural study. *Journal of Conflict Resolution* 36: 242-262.
- Gelfand, Michele J., et al. (2011) Differences between tight and loose cultures: A 33-nation study. *Science* 332.6033: 1100-1104.
- Harrington, Jesse R., and Michele J. Gelfand. (2014) Tightness–looseness across the 50 united states. *Proceedings of the National Academy of Sciences* 111.22 (2014): 7990-7995.
- Hsiang, Solomon M., Marshall Burke, and Edward Miguel. Quantifying the influence of climate on human conflict. *Science* 341, no. 6151 (2013): 1235367.
- Kang, B. W. (2000) A reconsideration of population pressure and warfare: A protohistoric Korean case. *Current anthropology*, 41(5), 873-881.
- Lambert, Patricia M. (1997) Patterns of violence in prehistoric hunter-gatherer societies of coastal southern California. In *Troubled times: Violence and warfare in the past*. D. L. Martin and D. W. Frayer, eds. Gordon and Breach, pp. 77-109.
- Lekson, S. (2002) War in the Southwest, war in the world. *American Antiquity*, 64 (4): 615.
- Peregrine, P. N. and C. R. Ember. (n.d.) Network Strategy and War. In *Alternative Pathways to Complexity: Households, Markets, World Systems, and Political Economy: Essays Honoring the Legacy of Richard E. Blanton*. Lane F. Fargher and Verence Y. Heredia Espinoza, eds. University of Colorado Press (in press).
- Zhang, David D. Jane Zhang, Harry F. Lee, Yuan-qing He. (2007) Climate change and war frequency in eastern China over the last Millennium. *Human Ecology*, 35:403-14.