

# Models of Cultural Diversity

Dan Hruschka  
Santa Fe Institute  
Email: [dhrusch@santafe.edu](mailto:dhrusch@santafe.edu)

1

## Anthropology

- The Study of Human Diversity
- Examples of Questions
  - Why did some populations form states, while others live in autonomous villages, and others in nomadic bands?
  - Why can some individuals digest milk, while others cannot?
  - Why does cultural diversity correlate with biological diversity?
  - "Is U.S. culture degrading"

2

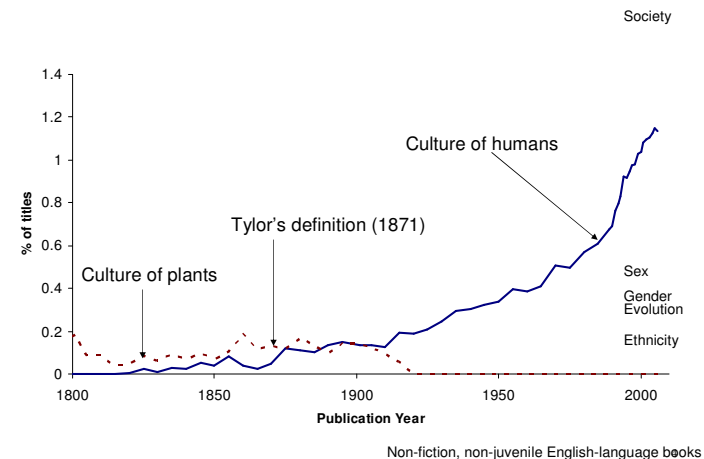
## A key concept: culture

- The meaning has changed in the last 100 years
- Originally, some people had culture (i.e. "high culture") and some people didn't
- Now, everyone has a culture



3

## "Culture" in WorldCat database



## Overview—Three Lectures

1. Theories about the origins of cultural diversity (and what is culture?)
2. Simple models of social learning
3. Null models of language change

5

## Overview—Recurring Questions

- What generates observed patterns of cultural diversity?
- Social learning
  - When does it make sense to learn from others?
  - How do different learning rules affect the distribution of behaviors and ideas in a population?
  - How does community structure affect the transmission and maintenance of cultural knowledge?
- Cultural evolution at the group level
  - To what degree are human cultural groups subject to selection?
  - What are the appropriate units for describing cultural change?
  - Are extant patterns of cultural diversity a result of branching with isolation or long-term mixing between groups?
- Innovation
  - How do innovations arise?
  - Are there general principles of innovation?
- What models and data exist to answer these questions?

6

## Lecture 1: Overview

- What is culture?
- What theories can account for cultural diversity?
- Are observed patterns of cultural diversity the result of Darwinian processes?

7

## Overview: Defining Culture

- Human communities are complex
- Human communities are flexibly complex
- A working definition of culture

8

## Human communities are complex

- Multiple elements (people, material artifacts, animals, ideas)
- Actions and consequences are dependent on the actions of others
- Defining human communities as societies, cultures, or ecologies depends on your point of view
  - ❑ *Society*: People in social interactions (exchanging, dominating, communicating)
  - ❑ *Culture*: Focus on ideas, symbols, material artifacts, and language
  - ❑ *Ecology*: Focus on human interactions with environment—animals, plants, physical world

9



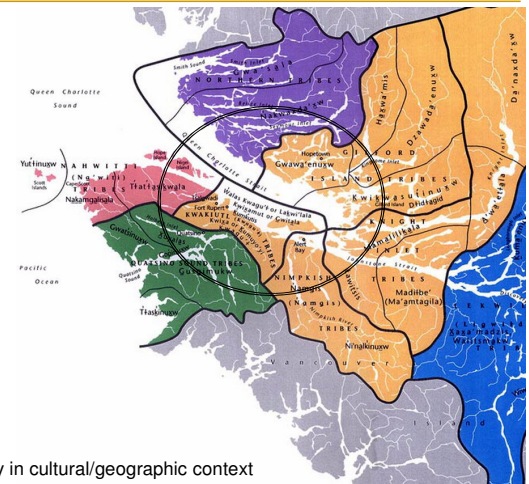
Kwakiutl throne room

10



Kwakiutl Village, British Columbia, Canada

11



Kwakiutl territory in cultural/geographic context

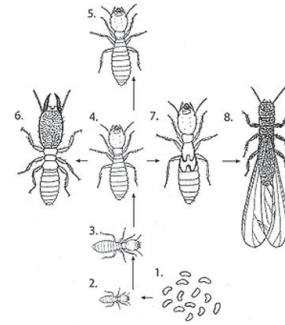
12

## Human communities are flexibly organized

- Humans, as a species, are unique in the diverse ways that they can be re-assembled into novel complex systems.
- Compare this with termites.

13

## Termite life course



**Larvae (2):** Just hatched (small size, soft head & mouth parts, no coloration). Depend on worker termites to feed them.

**Workers (5):** Most common—consume wood, feed & groom others, build & repair tunnels (white and soft bodied, darker head, hard mouthparts). At maturity, workers molt regularly w/o size increase. If isolated, may molt into reproductive stage (tertiary reproductive).

**Soldiers (6):** Rare—defend colony. Enlarged heads and mandibles adapted to plug holes in tunnels and inflict a painful bite on invading enemies. Depend on workers to feed them.

**Nymphs (7):** Preparing to molt into fully winged termites (8) and leave the nest to start new colonies. If isolated, may become capable of reproduction (secondary reproductives).

14

## Termite Mound



Northern Territory, Australia

15

## Diversity in human re-assembly

- Spatial patterns
- Life history
- Food extraction and preparation
- Language and symbol systems

16

## Spatial: Bororo, Brazil

- Hunting/fishing/maize
- Now, pop.=700 in 9 villages
- At contact pop.=~15000
- Move frequently (5 yr)
- 2 major matrilineal clans
- 8 minor clans
- Clans define:
  - Village layout
  - Marriage and incest
  - Godparents
  - Sources of cultural info

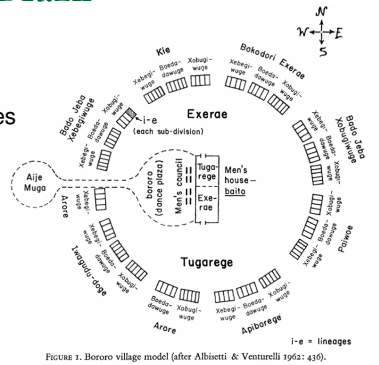
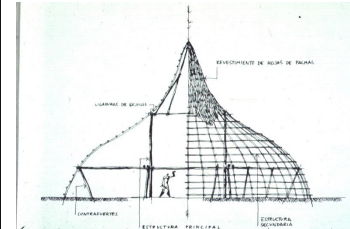


FIGURE 1. Bororo village model (after Albini & Venturini 1962: 430).

Ideal Village Plan: any real village only approximates this

17

## Spatial: Piaroa, Venezuela



- Shifting cultivation, hunting, gathering
- 10-70 in a single house, or isode

18

## Spatial: Taos Pueblo, USA

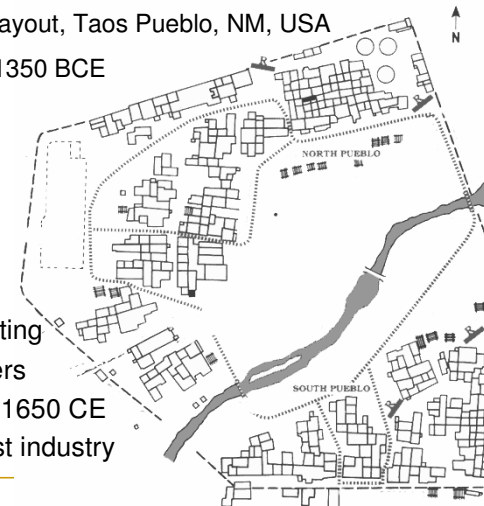


North Pueblo, Taos. The governor stands on the uppermost roof making an announcement to the people.

### Main Buildings Layout, Taos Pueblo, NM, USA

Occupied since 1350 BCE

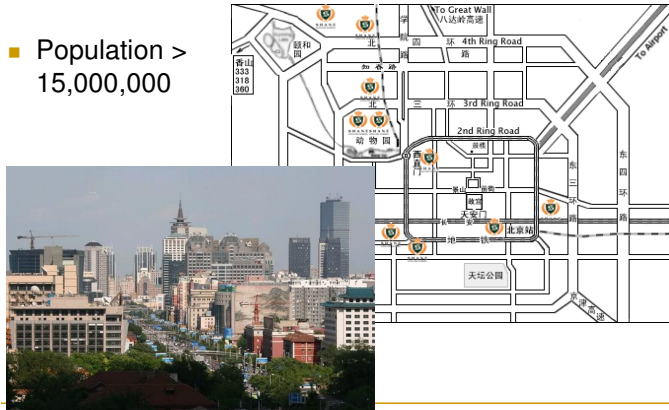
- Agriculture/hunting
- Trade with others
- Pop.=~2000 in 1650 CE
- Now 150, tourist industry





## Spatial: Beijing, China

- Population > 15,000,000



21

## Los Angeles, USA, July 2004



## Life course: Maasai



23

## Life course: Maasai

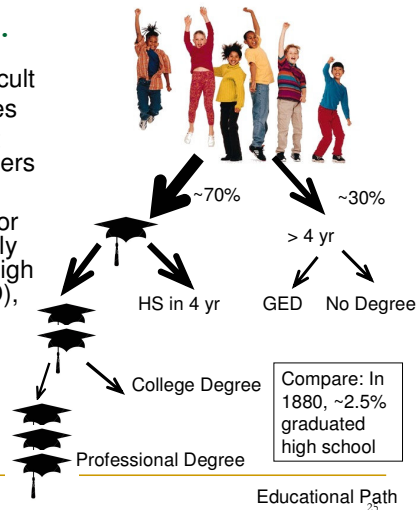
- Non-reproductive: girls work at home, boys herd
- Women
  - married (15-20 y)
  - Widows may not remarry
- Men
  - (15-25 y) Warrior (*moran*)—protect cattle of father and steal those of other communities. Marked by long hair, can carry spears. Must remain unmarried.
  - become elders and can marry (25-35 y).
- Pattern is accompanied by polygyny and large populations of widows



Photo Credits: Pu Qian

## Life Course: U.S.

- A diagram is more difficult
- Many occupational roles
- Relatively same age at marriage for both genders
- Monogamy
- Approx. 1% in military or law enforcement, mostly from those who have high school degree (or GED), but no college degree.



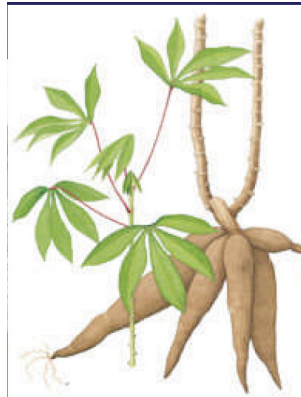
## Preparation of Food and Drink

- Preparing Cassava
- Preparing Maize
- Preparing Ayahuasca



## Cassava

- Dietary staple in many societies
- Cassava can be highly toxic in raw state (cyanide)



## Preparing cassava root

- Outer peel is removed
- Roots washed and grated to watery mash
- This frees cyanide which leaches into water
- Mash separated into three parts: liquid, starch, fiber
- Starch and fiber stored 24-48 hours
- Recombined and baked

## Maize

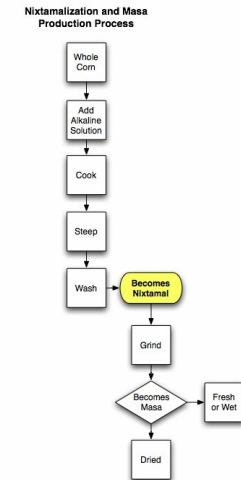
- High reliance on corn in many American cultures
- Low availability of vitamin niacin →
- *Pellagra*
  - Diarrhea
  - Dermatitis
  - Dementia
  - Untreated, can kill in 4-5 years



29

## Preparing Maize

- Mixing with alkali (lime or ashes) releases niacin
- *Nixtamalization*: Nextli = ash, tamalli = corn dough
- It took modern science many decades to understand how this process works



30

## Ayahuasca

- Hallucinogenic drink
  - Visual illusions
  - Feeling “peaceful”
- Boil or soak bark & stems of one plant (*Banisteriopsis caapi*)
- Combined with leaves of another plant (*Psychotria viridis*)
- Combination necessary for the psychedelic effect



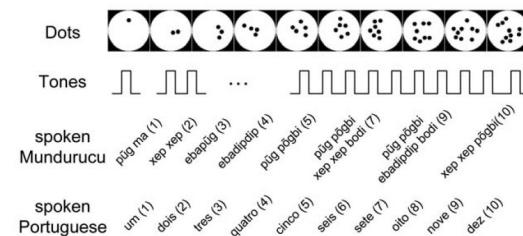
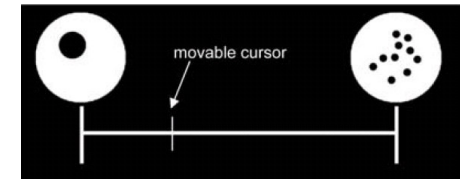
+



McKenna (1999)

31

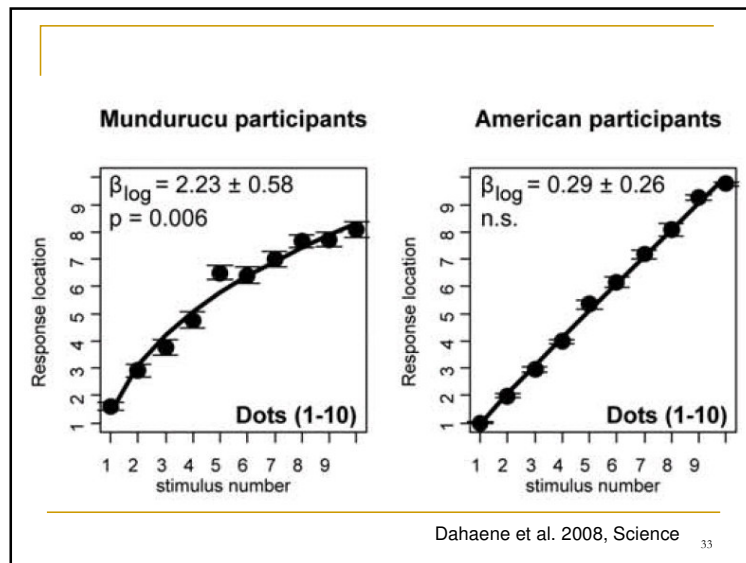
## Cognitive Organization



Dahaene et al. 2008, Science

32





## Conclusion: Not only complex

- Human communities are also highly flexible
  - Social organization
    - Number/types/and chronology of social roles
    - Residential patterns
    - Population size
    - Kinship
  - Ideas and Practices
    - Food extraction and preparation
    - Mythology
    - Food taboos and preferences
    - Preferences for fairness and justice

34

## A working definition

- Culture is the observed differences that exist between human communities in practices, ideas, or social organization.
- Contrast with other definitions: “Information that people acquire from others by teaching, imitation, and other forms of social learning” Boyd and Richerson 2005.

35

Whence  
such  
diversity?

36

## Deterministic explanations

- *Race*: Early attempts to describe cultural diversity in terms of inherited biological differences.
- *Rational choice in context*: "This is what any rational person would do in this ecological setting."

37



R. W. Shufeldt, "Comparison of the physiognomy of a Congo Negro and Caesar," 1915

*Problem*: "Race" is poor predictor of any kind of ability



39

## Ecological Explanations: Culture is an epiphenomenon

- Rational individuals behaving in a rational way according to their context
- *Problem*: the variety of ecological contexts is too great



Task 1: Get out of here alive

Task 2: Live here

Sonora Desert 40

## The Result of Darwinian Processes?

### ■ Criteria

- Something begets something
- Modification of the new something
- This creates variation and some variants are better at begetting than others

To borrow John Pepper's formulation in terms of "somethings"

41

## What are the somethings?

- People?
- Communities?
- Ideas?
- Behaviors?
- Functional complexes (i.e. blacksmithing)?

42

## Some case studies

### ■ Words

- Greek City-States
- Clan lineages

43

## A Word: 'Television'



- First public demonstration in 1926 in Scotland.
- a blurry reddish-orange picture about half the size of a business card

44

## A Word—'TV'

- Variants—'TV', 'Television', 'Television Set'
- 'Television' (1907, Scientific American)
- 'Television receiver' (1927), 'Television screen' (1927), 'Television apparatus' (1930), 'Television supper' (1931), 'Television box' (1932).
- 'TV' (1948, Fortune Magazine)
- 'TV receiver' (1964)
- British National Corpus: 'TV' (6475 occurrences), 'Television' (9773 occurrences).
- Thought experiments: 'T', 'A machine that receives moving pictures'.

Dates from Oxford English Dictionary

45

## Four principles of selection in words

- Reduction of effort
- Ability to discriminate
- Frequency dependence
- Rules of formality

Croft 2008

46

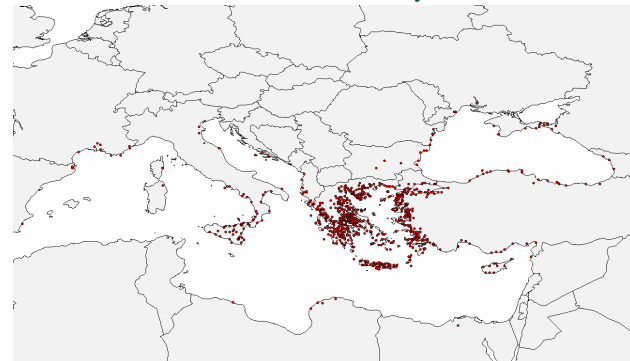
## Meme

- Definition: Any unit of cultural information, such as a practice or idea, that is transmitted verbally or by repeated action from one mind to another. Examples include thoughts, ideas, theories, practices, habits, songs, dances and moods.
- The definition focuses on replication from "one mind to another."

Wiktionary

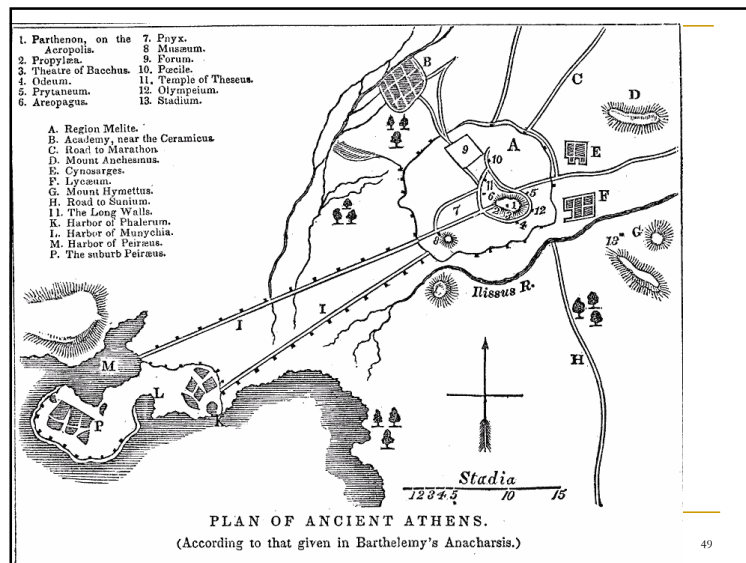
47

## More than memes?—City-states



800-400 BCE: more than 500 Greek city-states founded by ~20 "mother-cities"  
Different laws, decision-making bodies, military organization.

48



## Is a Greek City State a Meme?

- It reproduces through the fission of an existing city-state
- A subgroup of individuals with different roles (leaders, stonemasons, merchants, farmers)
- It does not reproduce by passing from "mind to mind", but by "budding off"

## More than memes?—Clans

- Membership based on father's membership
- Could include > 1000 members
- Centered on hall of ancestors
- Functions for members:
  - Ran schools
  - Governed communal land
  - Extended cheap credit
  - Protect property of members
  - Resolved conflicts
  - Punished violators
- Other effects:
  - Pressured members to have children

Peng (2004). American Journal of Sociology

## A Darwinian process?

- Division of clans during migration & when clans become too large
- Were their functional differences in clans that would make some more likely to produce daughter clans?
- Did clans pass on the practices to daughter clans with sufficient fidelity to maintain functional differences?



## So far, four possibilities

- Biological differences
- Rational behavior in context
- Darwinian processes
  - Changing frequencies of ideas and practices over human substrate due to processes of psychological or biological selection.
  - Changing frequencies of social units (clans?, greek city-states?) due to functional differences in customs & social organization.

53

## A final possibility

- Observable variation is the result of random change and descent
- We'll also review evidence for this in the next two lectures

54

## Wrap-up

- Humans re-assemble themselves into communities in many diverse ways
- There are several theories (some obviously better than others) to account for this diversity

55

## Next Steps

- Review current approaches to answer questions about what generates cultural diversity
- What models and data are currently available?

56

## Next Steps

- Lecture 2: How does cumulative social learning lead to change in the frequency of practices and ideas within communities?
  - Read Henrich & McElreath (2003).
- Lecture 3: Null models of language change