Some Basic Concepts in Archaeology

1

2

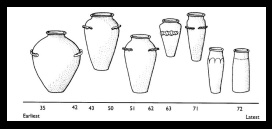
3

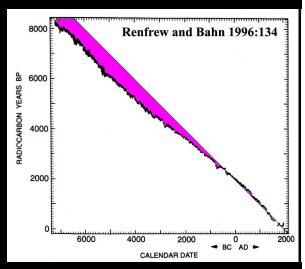
…more analysis…

Period	Nakovana Cave phase	Stratigraphy	"Culture"
Iron Age	7		Illyrians
Bronze Age	6		
Late Copper Age	5B		Cetina
Early Copper Age	5A		Nakovana
Late Neolithic	4B		Hvar
	4A		
Middle Neolithic	3B		Vela Luka
	3A		Danilo
	2		"Post-Impresso"
Early Neolithic	1B		Impresso
	1A		

4

…and still more analysis...





5

… seemingly without end (?)

6

- How do things get buried?
- How do sites form?

7

Formation Processes

- Natural
  - Geological deposits
    - Dust
    - Ash
  - Hydrological deposits
    - Flood sediments
    - Δ sea- and lake-levels
    - Erosion deposits, e.g., mudslides
  - Biological
    - Earthworms
    - Leaf fall: humus
- Cultural
  - Artifacts made
  - Architecture
  - Discard: rubbish deposited
  - Loss
  - Caching
  - Ritual interment

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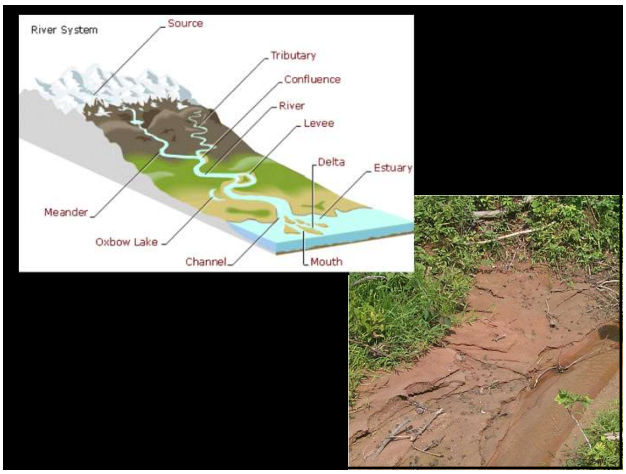

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- Things and people get buried, frozen, or waterlogged.

11

12

Formation of a mound site

In West Asia, mound sites are called “tells”.

13

Tell Barri, NE Syria

14

Tell Barri, NE Syria. Excavation area, showing the mound’s strata.
Note the person in the middle – for scale.

15

What are archaeological facts?

Observations, made in the present, of the material remains of the past.

How do we bridge the gulf between the past and the present?

16

The annals of deep time are written in layers of rock and sediment.
Nature is understood to have operated in the past in same way as it does in the present.
This unlocks the past.

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Lens of the present

- Archaeological data are observations, made in the present , of the material traces of actions/events in the past.
- How is this gap bridged?
- By formulating , and then testing, hypotheses grounded in uniformitarian assumptions.
- Hypotheses are often based on ethnographic analogy; they make uniformitarian assumptions about human behaviour.

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Finding the past: Archaeologists start at the top!

19

Finding the past

- How do anthropologists find the past?
- That is, if material remains (of things or people) are the only sources of information about the long-ago past, what do archaeologists and palaeoanthropologists look for?

20

Types of Sites: Open Air

5000-year old Neolithic structures – walls, paths, buildings – revealed by excavation at the Ness of Brodgar, Scotland

21

Types of Sites: Cave

Liangbua Cave, Indonesia

22

Types of Sites: Burial & Ceremonial

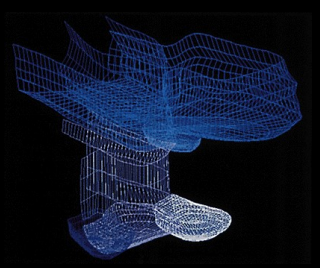
Burial beneath house floor, Çatal Hűyűk, Turkey.

Unexcavated Mayan pyramid

23

More types of sites

Recording details of an underwater site



A virtual site: all the recorded data from a Bronze Age structure and pit, rendered as a computer-assisted drawing

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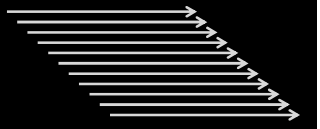
Reading the Landscape

- Archaeological Survey Recovery Methods
  - Variety of techniques used, including:
    - Walkover or shovel testing
    - Remote sensing
    - Magnetometry and ground-penetrating radar
- Geographical Information Systems
  - GIS are software applications that enable archaeologists to bring together different types of spatial data and examine them together

25

Fieldwalkers surveying the island of Hvar, Croatia

26



Parallel transects at 25 m intervals

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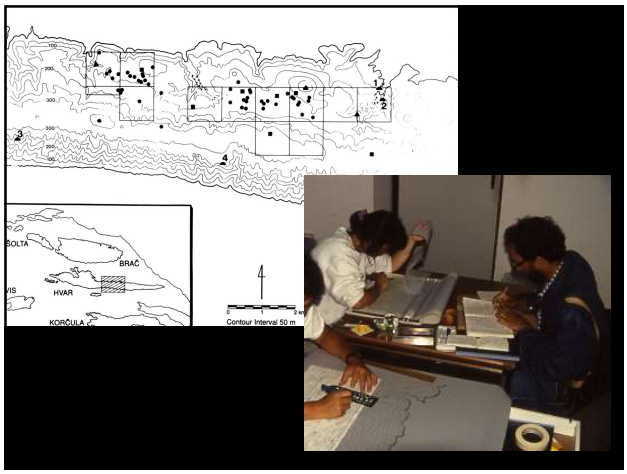
Above: Part of a hillfort's walls in Dalmatia
Right: A stone cairn (a burial mound) in Dalmatia

29

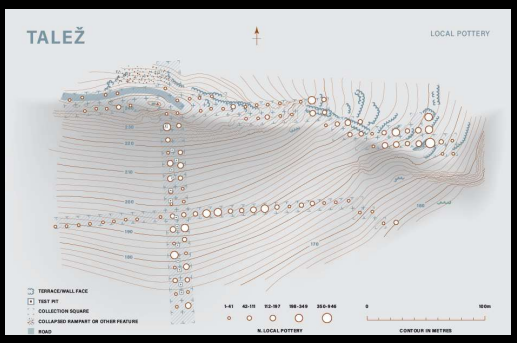

BRAČ
HVAR
KORČULA
Contour Interval 50 m

30

Talež hillfort, island of Vis

31

Surface survey of Talež hillfort



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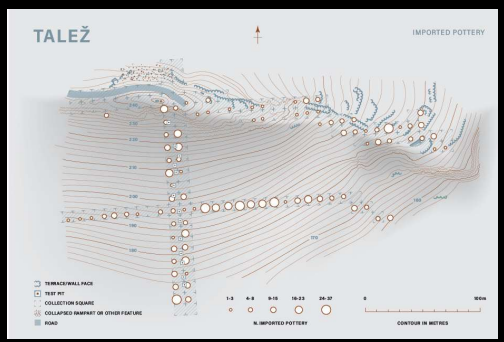
Surface survey of Talež hillfort



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Reading the Landscape

- Geographical Information Systems (GIS)
  - GIS are software applications that enable archaeologists to bring together different types of spatial data and examine them together
  - GIS software "layers" information allowing users to look at as few or as many types of information as needed at one time

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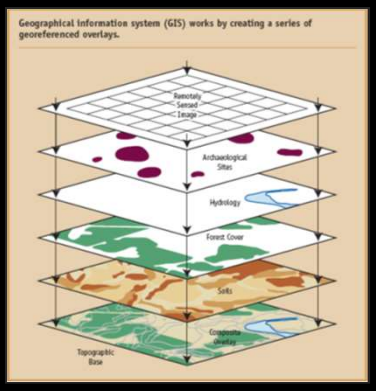
Geographical Information Systems



Geographical information system (GIS) works by creating a series of geo-referenced overlays.

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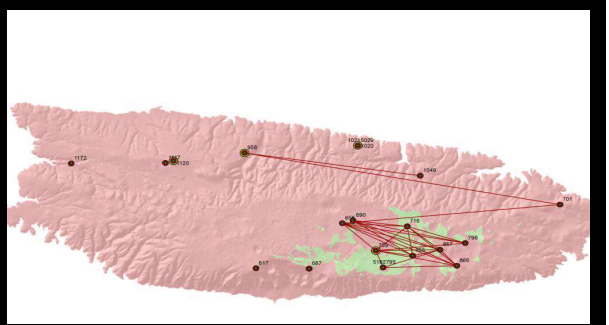

GIS can show us, for example, what can be seen from different places on the landscape. Here the visual links between prehistoric hillforts on the island of Brač in the Adriatic are shown.

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Excavation

- Horizontal Excavation
  - Used to expose remains of a single point in time
    - For example, the floor of this Haudenosaunee longhouse at Crawford Lake, Ontario
- Vertical Excavation
  - Used to expose a sequence of occupation
    - For example, any site which has been occupied repeatedly over time

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Excavation of the Koster site in Illinois. Stratigraphic units are being dug sequentially.

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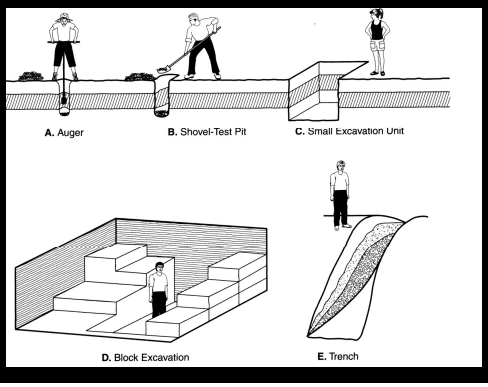
Types of excavation



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Stratigraphy

- The Law of Superposition
  - In an undisturbed depositional sequence, each layer is younger than the layer beneath it
- Stratigraphy on archaeological sites
  - Refers to the accumulation of strata from geological and anthropogenic deposits
  - Archaeological layers, or strata, only emerge through stratigraphic analysis

Oxbow Archaeological Site
Courtesy of New Brunswick Archaeological Services

The Oxbow archaeological site is over two metres deep. The old campsite layers of the Mi'kmaq village are separated by layers of sand and silt deposited during spring freshets. A team of archaeologists carefully excavated each layer.

40

Law of Superposition

In an undisturbed stack of layers, the oldest layer is at the bottom and the youngest layer is at the top.

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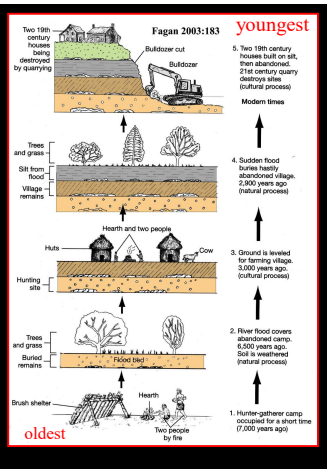
Law of Superposition

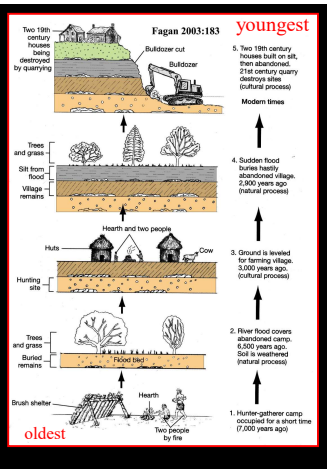
- In any stack of undisturbed layers, the oldest layer is at the bottom and the youngest layer is on top.
- Artifacts lose much scientific meaning if removed from their 'depositional context'.
- Idealized archaeological site is a 'layer cake'. Each successive layer contains artifacts deposited in increasingly more recent times.



42

Law of Superposition

- By controlled excavation, these 'layers' of history are systematically exposed, examined, documented, and then removed to expose the underlying deposits.
- The archaeological record are sequential 'chapters' defining the culture history of a place… You read the book backwards.



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Excavation

- Controlling Horizontal and Vertical Space
  - Essential to modern archaeological excavation
  - Horizontal control achieved by using a grid system
  - Vertical control achieved through use of the datum point

Excavation of Robert Service's Cabin, Dawson National Historic Site, Yukon.

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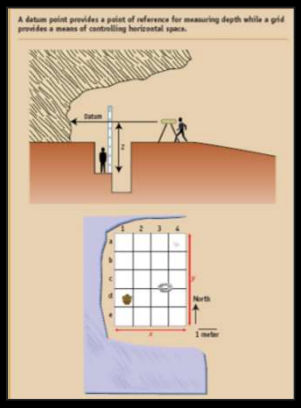
Controlling Horizontal and Vertical Space



A datum point provides a point of reference for measuring depth while a grid provides a means of controlling horizontal space.

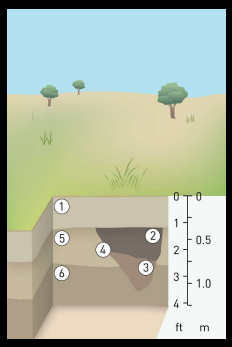
45

Stratigraphic excavation

A small excavation showing the stratigraphic profile with three major layers (1, 5, 6) and a buried pit (4) with two kinds of fill (2, 3).

A basic description of the layers might be as follows. ("Sterile" means there were no archaeological finds in that layer.)

1. Plow zone of red-brown sandy humus, little archaeological material.
2. Dark-brown silty sand with fine layers, windblown, sterile.
3. Yellow sandy clay, washed in, artifacts present.
4. Outline of pit (interface between pit fill and layers 5 and 6).
5. Brown sandy clay with soil formation, sterile.
6. Subsoil, dark sandy clay, water deposited, perhaps old lake deposit, sterile.



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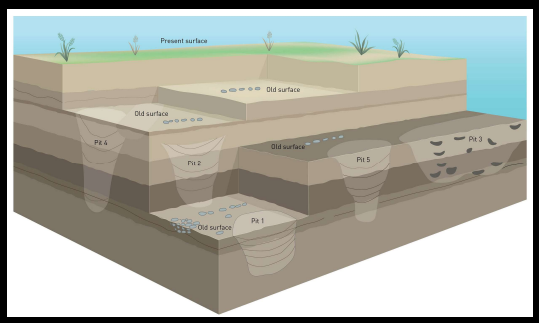
Stratigraphic excavation



A three-dimensional view of a complex stratigraphic sequence with multiple cultural layers and pits.

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Position in 3 dimensions

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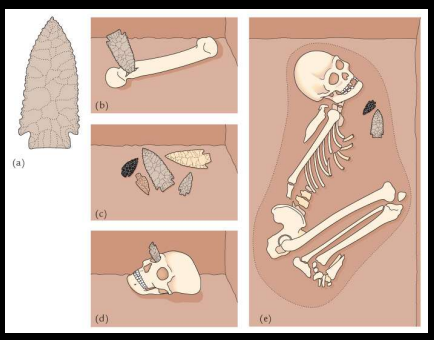
Context generates the *Law of Association*:

When artifacts are found together, then that togetherness means something.

49



Spatial context is crucial. Here are various possible spatial contexts and associations for artifact (a).

50

Excavation

- Recovery Methods
  - Screening of soil detects smaller artifacts
  - Wet screening detects even finer pieces
  - Flotation used to recover botanical material

- Recording Methods
  - Allow archaeologists to reconstruct the context of archaeological objects after excavation
  - Essential because archaeology is destructive

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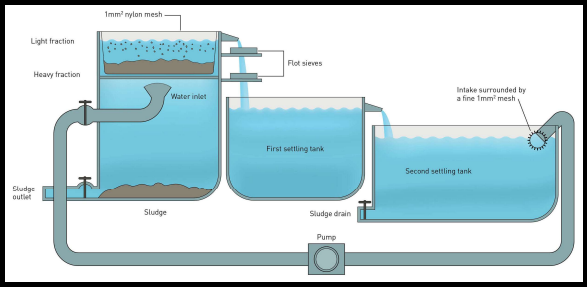

Diagram of flotation equipment in action. Water is pumped through a series of tanks and the lighter fraction of the sediments, largely charcoal and charred plant remains, rises to the top. Heavier sediments drop to the bottom of the tank.

54

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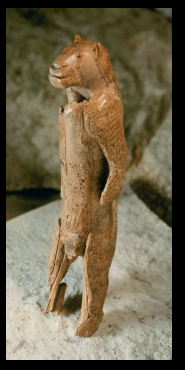
Artifacts and Ecofacts

Artifacts
- Objects recovered from archaeological contexts that show traces of human manufacture

Ecofacts
- Objects recovered from archaeological contexts that are remains of biological organisms or geological processes



Hohlenstein ivory figure dating to the Aurignacian period.

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Quantification and Sampling: Counting Artifacts

- Types are major categories of objects
  - Archaeologists often sort artifacts on the basis of their material of manufacture
- Typologies are lists of detailed artifact types for a particular archaeological context
  - Typologies are used to draw up inventories of artifacts found at a site
- Attributes are particular characteristics of artifacts
  - Statistical analyses of attributes can be used to learn more about a site

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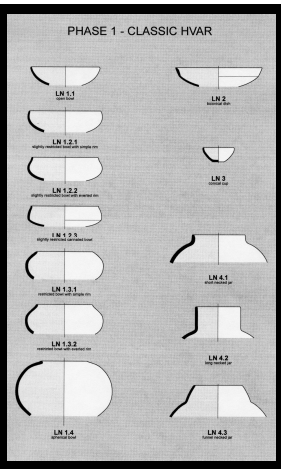

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Creating a Chronology: Relative Chronology

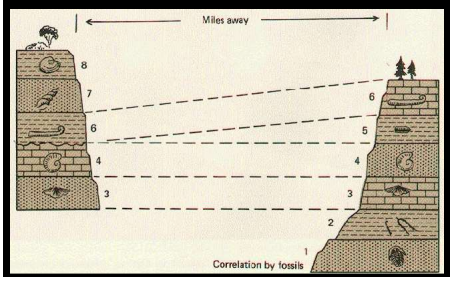
- Relative chronologies are based on artifact typologies and place assemblages in a temporal sequence not directly linked to calendar dates
  - Seriation (ordering) is the method of comparing the relative frequency of artifact types between contexts—used to create regional relative chronologies

59

Index fossils

Geologists developed the concept of the "index fossil" to cross-date beds of sedimentary rock.

When the same kind of fossil is found in two different layers of rock, separated by some distance, we infer that the layers are of the same approximate date.



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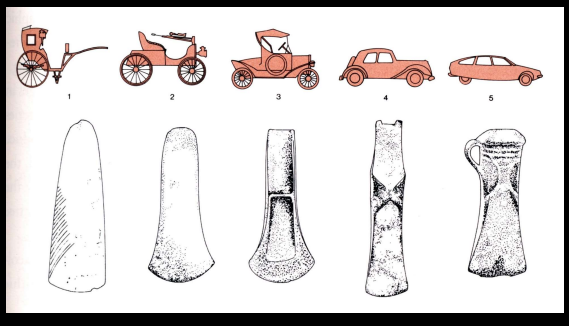
Time markers

Archaeologists have found that some things made by people – artifacts – change over time much like an "index fossil". Thus, artifacts can be used to cross-date archaeological layers and sites.



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Layers can be dated by their contents

North profile, Trench III,

Ancient Pharos, Stari Grad, Croatia

63

Creating a Chronology: Absolute Chronology

- Absolute chronologies are stated in terms of calendar years
  - Scientific methods used to determine absolute dates of archaeological materials include:
    - Argon dating
    - Luminescence dating
    - Dendrochronology dating
    - Paleomagnetic dating
    - Radiocarbon dating
    - Obsidian hydration dating

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In general…

- Most absolute dating methods focus on materials that undergo physical or chemical transformations at some constant, known rate.
- The amount of transformation is directly proportional to the amount of time that has passed.

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- For example, say we have a block of frozen material.
- A puddle of this material in liquid form has appeared beneath the block.
- The block is melting.
- If this block melts at the known rate of 10 ml/hr, and the volume of the puddle is 120 ml, how old is the puddle?
- Ans: 12 hrs.

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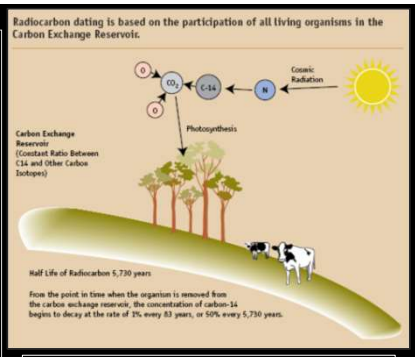
- Cosmic radiation, a shower of neutrons, bombards the upper atmosphere.
- When a neutron collides with ^{14}N, it creates a radioactive isotope of carbon, ^{14}C.
- This isotope is rare; there are 3 isotopes of carbon (the other two are more common).



- ^{14}C enters the food chain.
- The proportion of ^{14}C and non-radioactive ^{12}C is reflected in the tissues of all living things.

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Radiocarbon Dating – Basic Points

- ^{14}C dating is based on the participation of all living things in the carbon exchange reservoir
  - Cosmic radiation creates ^{14}C in the upper atmosphere
  - The ratio of ^{14}C and other carbon isotopes is constant in the carbon exchange reservoir
  - All living things are part of the carbon exchange reservoir
  - From the moment an organism dies, the ^{14}C in it decays at a rate of 50% every 5,730 years

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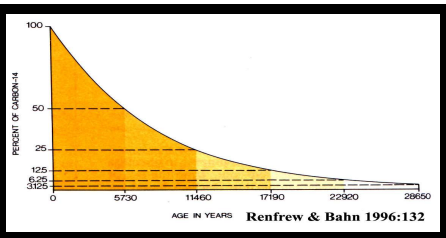

When an organism dies, the proportion of ^{14}C to ^{12}C changes as the radioactive ^{14}C slowly decays back to ^{14}N. With time, the percentage of ^{14}C slowly declines at a constant rate, 1% every 83 years or 50% every 5730 years (the "half-life" = 5730 years)

Measuring the relative abundance of ^{12}C and ^{14}C in an organic sample allows an estimate of the time since the organism died.
This method is approximate and probabilistic. Its imprecision reflects variations in radiation, measurement error, contamination, etc.

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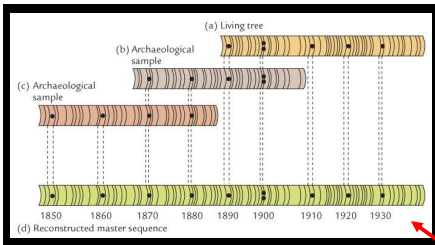
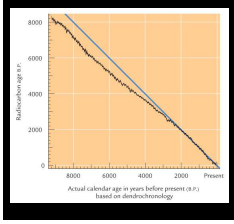


Calculating a master sequence



Calibrating radiocarbon dates with dendrochronology

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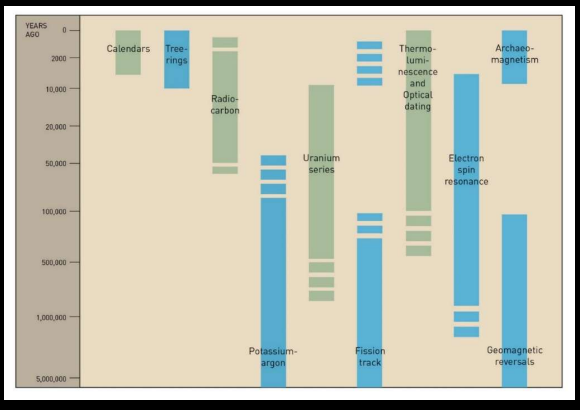
Chronological table summarizing the spans of time for which different absolute dating methods are applicable.



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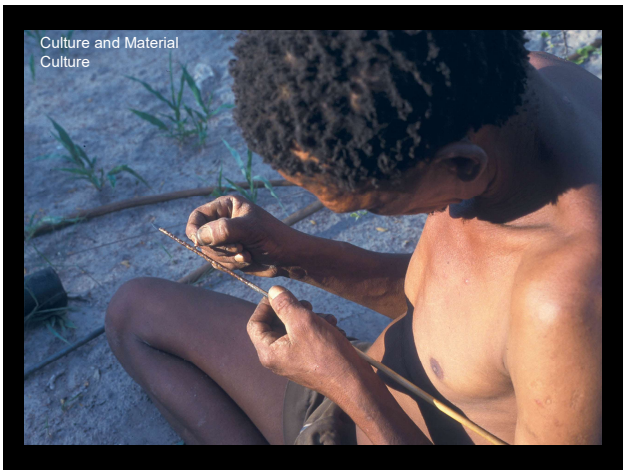

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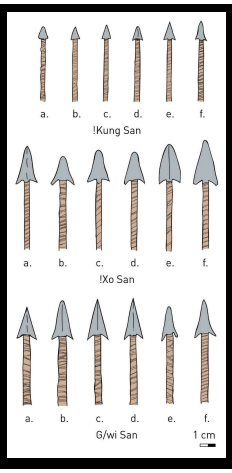
Typical arrows from three groups of San hunters in southern Africa.

The points are made from identical materials by related groups of people and there are clear differences among the groups that match distinctive language dialects.



Polly Wiessner studied variations in material culture seen among hunter-gatherers in Southern Africa's Kalahari Desert.

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Artifacts mark identity

- A Taiwanese tea kettle (top left)
- A British Denby tea set (bottom left)
- A decorated Russian samovar (bottom right)

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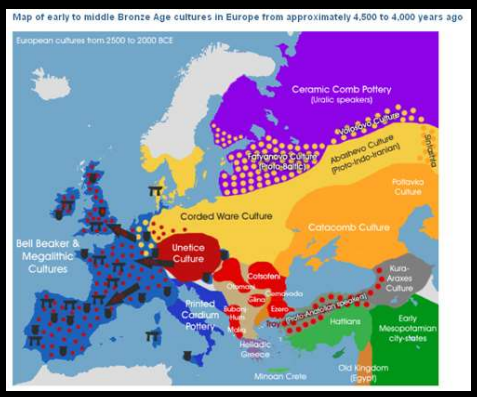
The "archaeological culture" concept

"We find certain types of remains – pots, implements, ornaments, burial rites, house forms – constantly recurring together. Such a complex of regularly associated traits we shall term a 'cultural group' or just a 'culture.' We assume that such a complex is the material expression of what would to-day be called a 'people' …"

From the introduction to *The Danube in Prehistory* (Childe 1929: v-vi)

75



Archaeological Cultures in Bronze Age Europe

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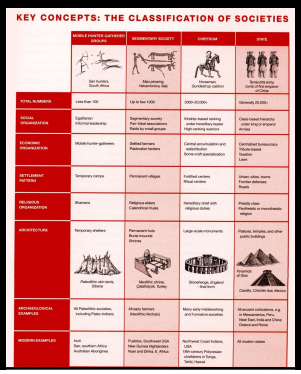
Types of Society:
Bands, Tribes, Chiefdoms, and States



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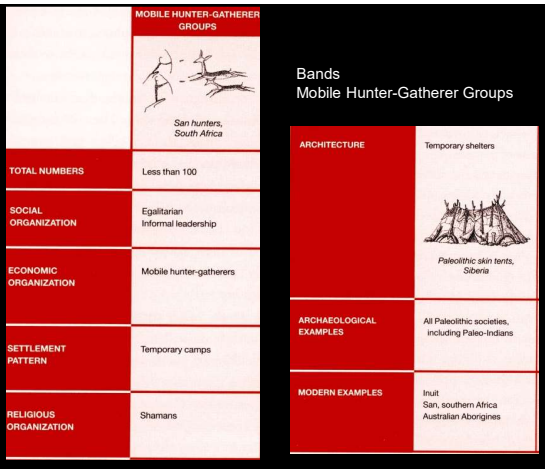

Bands
Mobile Hunter-Gatherer Groups

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	SEGMENTARY SOCIETY
	 *Man plowing, Valcamonica, Italy*
TOTAL NUMBERS	Up to few 1000
SOCIAL ORGANIZATION	Segmentary society Pan-tribal associations Raids by small groups
ECONOMIC ORGANIZATION	Settled farmers Pastoralist herders
SETTLEMENT PATTERN	Permanent villages
RELIGIOUS ORGANIZATION	Religious elders Calendrical rituals

Tribal or Segmentary Society

ARCHITECTURE	Permanent huts Burial mounds Shrines  *Neolithic shrine, Çatalhöyük, Turkey*
ARCHAEOLOGICAL EXAMPLES	All early farmers (Neolithic/Archaic)
MODERN EXAMPLES	Pueblos, Southwest USA New Guinea Highlanders Nuer and Dinka, E. Africa

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	CHIEFDOM
	 *Horseman, Gundestrup caldron*
TOTAL NUMBERS	5000–20,000+
SOCIAL ORGANIZATION	Kinship-based ranking under hereditary leader High-ranking warriors
ECONOMIC ORGANIZATION	Central accumulation and redistribution Some craft specialization
SETTLEMENT PATTERN	Fortified centers Ritual centers
RELIGIOUS ORGANIZATION	Hereditary chief with religious duties

Chiefdoms

ARCHITECTURE	Large-scale monuments  *Stonehenge, England - final form*
ARCHAEOLOGICAL EXAMPLES	Many early metalworking and Formative societies
MODERN EXAMPLES	Northwest Coast Indians, USA 18th-century Polynesian chiefdoms in Tonga, Tahiti, Hawaii

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	STATE
	 *Terracotta army, tomb of first emperor of China*
TOTAL NUMBERS	Generally 20,000+
SOCIAL ORGANIZATION	Class-based hierarchy under king or emperor Armies
ECONOMIC ORGANIZATION	Centralized bureaucracy Tribute-based Taxation Laws
SETTLEMENT PATTERN	Urban: cities, towns Frontier defenses Roads
RELIGIOUS ORGANIZATION	Priestly class Pantheistic or monotheistic religion

States

ARCHITECTURE	Palaces, temples, and other public buildings  *Pyramids at Giza*  *Castillo, Chichén Itzá, Mexico*
ARCHAEOLOGICAL EXAMPLES	All ancient civilizations, e.g. in Mesoamerica, Peru, Near East, India and China; Greece and Rome
MODERN EXAMPLES	All modern states

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