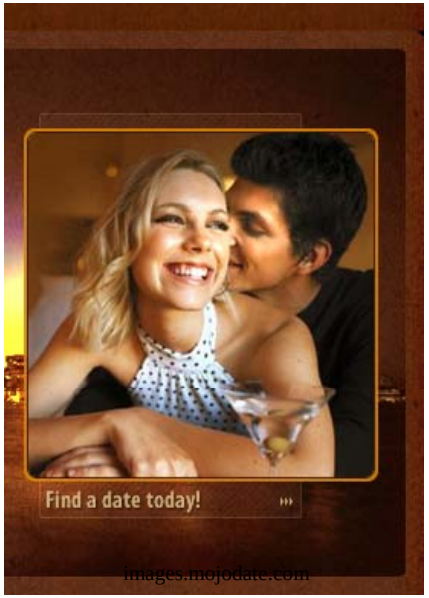




Dating

Advice, 10 cents







Two Types of Dating

- *Absolute* – assigns a numerical date to a past event

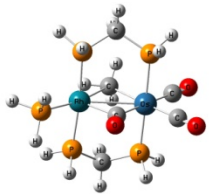
- *Relative* – does not equal "dating your sister"
  - Assigns order of events as older-than & younger-than (not how much)



Absolute Dating Methods

- Radiometric, half-life techniques
  - One half-life = time it takes for half of radioactive material to decay
    - Radiocarbon dating (HL = approx. 5,730 yrs)
    - Potassium-Argon dating (HL = 1.25 billion yrs)

- Other techniques
  - e.g., paleomagnetism, dendrochronology



A Smidgeon of Chemistry

- Isotopes = element forms whose nuclei have the same atomic number (number of protons in the nucleus) but different numbers of neutrons and mass
  - A radionuclide is an atom with an unstable nucleus
  - Undergoes radioactive decay by emitting subatomic particles
  - = radioactive isotope

- *If we can measure how fast decay occurs, we can date stuff*

Radiocarbon Dating



www.thebritishmuseum.ac.uk

- Uses C^{14}, which is radioactive
  - Half-life ≈ 5,730
- How does one know that one half-life has passed?
  - Ratio of C^{14} to either C^{13} or C^{12} (stable)
- Can be used to date organic matter (carbon)
- *Only useful back to a maximum of 60,000 years ago*

Two Important Concepts

- Target Event: what you would like to know the age of
- Dated Event: what you end up obtaining the age of
- *Target & Dated Events are not necessarily the same thing*

In which of the following are the TE & DE the same? Different?

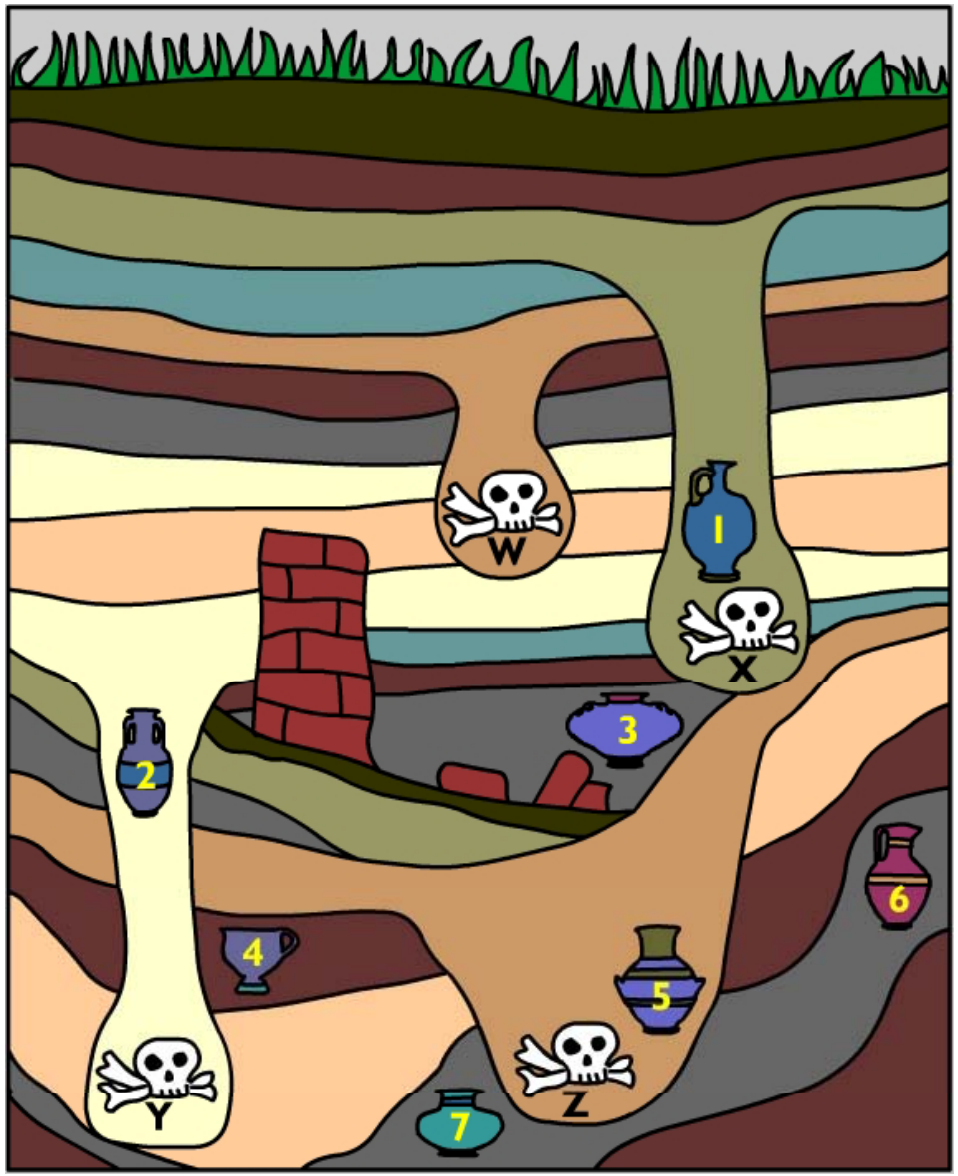
Event = Skeleton W

Event = Pot 1

Event = Brick

Event = Pot 5

Which is older W or X?



www.utexas.edu/courses/denbow

Relative Dating

A matter of style and function

Temporal Types

- Artifact forms that occurred during a restricted period

- Historical significance test (HST) = determines if form occurs over a short, discrete period
  - If not, it is not a good temporal type

- We use the PoS, PoA & C^{14} dating, and PoSI to administer the HST



SOSI BLACK-ON-WHITE
CA. 1070-1180





Paste: Light gray to white
Temper: Fine sand
Surface: Polished and slipped, slip is sometimes fine and grainy and may contain flecks of mica
Forms: Bowls and jars, rarely ladles
Design: Opposed barbed lines, interlocking rectilinear elements, jars have a band of decoration on body with simpler design on neck
Comparisons: Very similar to Flagstaff Black-on-White, but lines tends to be thicker and designs larger

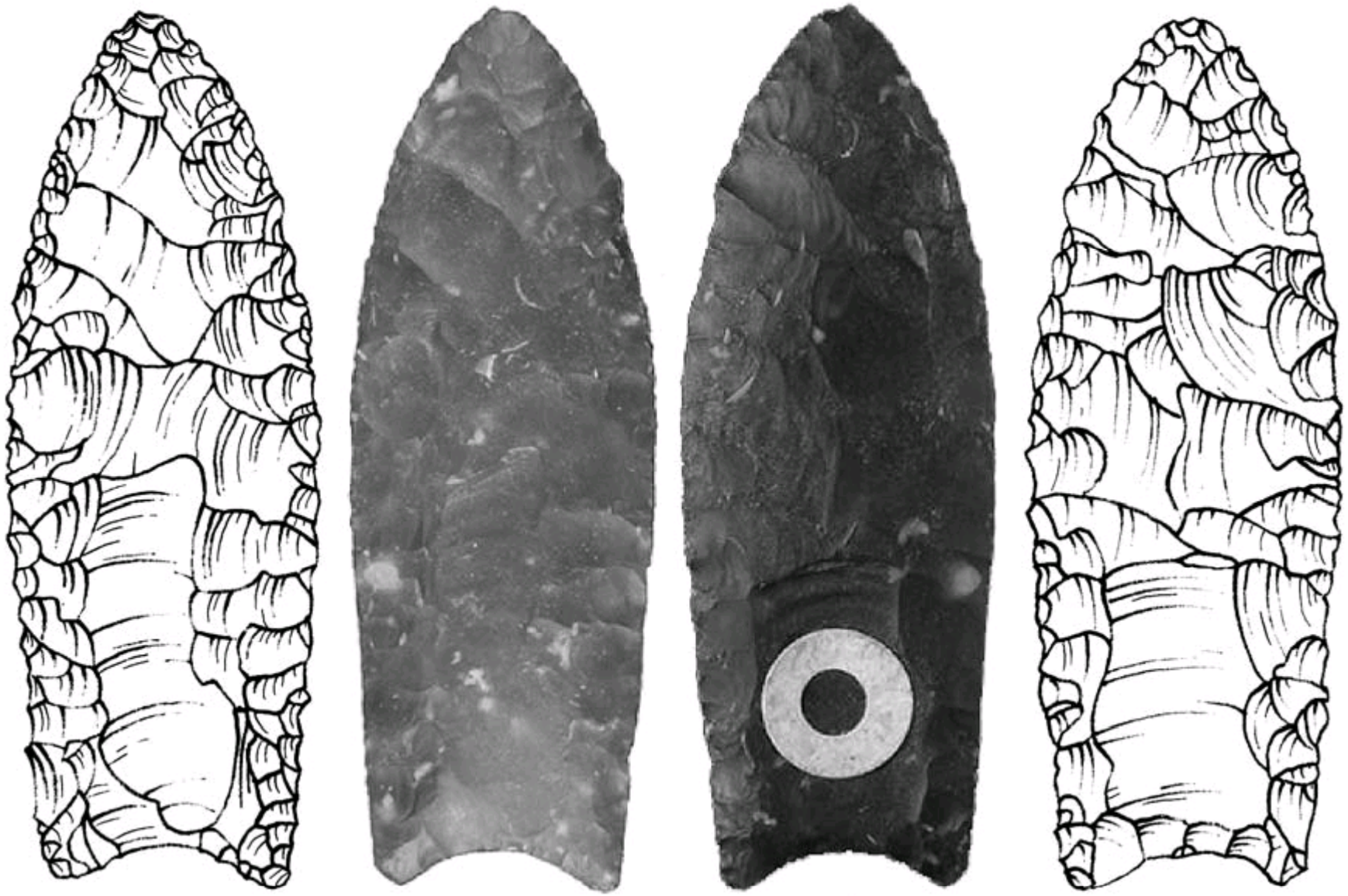






Mesa Verde Black-on-White

Anasazi
AD 1200-1300.
Mesa Verde Black-on-White
This mug was collected circa 1894.
Clay. H 9.0, D 11.2 cm
Palmer Collection, Chaco Culture National Historical Park, CHCU 92335


5 cm



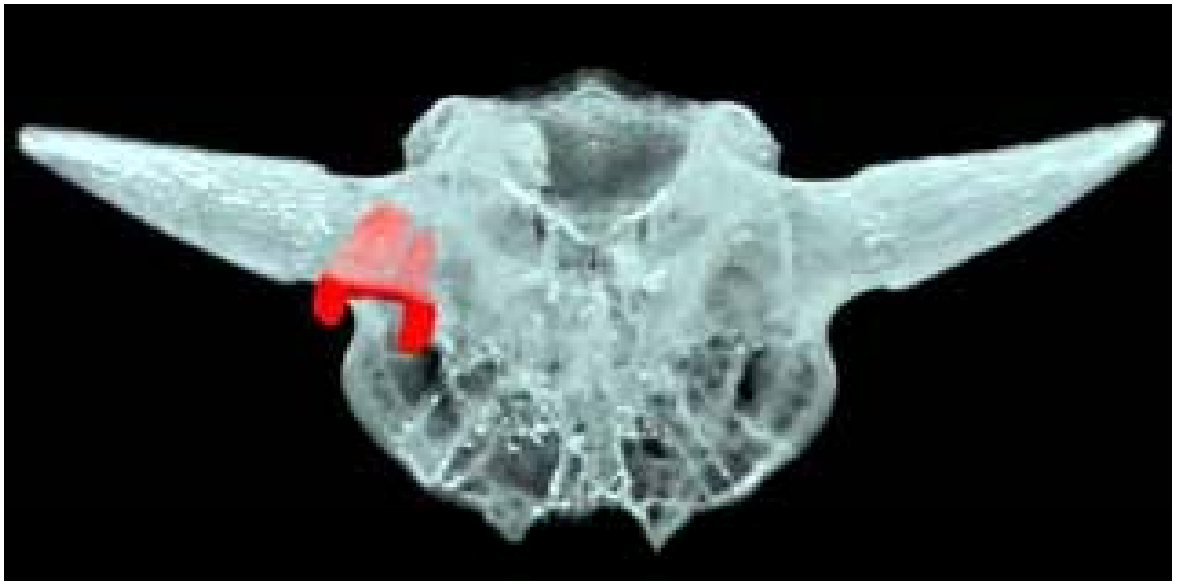
Clovis points
Circa 11,500 to 10,800 BP

Dalton point Circa 10,500 – 9900 BP



Folsom points
Circa 11,000 to 10,100 BP





Calf Creek Points
Late Archaic period
Circa 6000 BP





Cultural Evolution

- Artifacts reflect memes; recipes (ideas) on how to build artifacts (e.g., pottery)

- Selection works on ideas or memes
  - Memes persist because they solve problems
  - Examples: projectile points or wheels, general forms of which persist for long periods

- *Some memes are adaptively neutral*
  - They are not selected for or against
  - Three-tined vs. four-tined forks & decorative motifs on pottery

Change

- Because artifacts change through time *their forms* can be used to mark time

- Temporal types are artifact groups that are useful time-markers

- Change can be the result of selection or not (might be neutral memes that drift)

Style & Function

- Stylistic variation in memes is not acted upon by selection
  - Style = adaptively neutral cultural variation (reflected in artifacts)

- Functional variation in memes is acted upon by selection
  - if an idea works it persists until other, better adapted ideas out-compete it

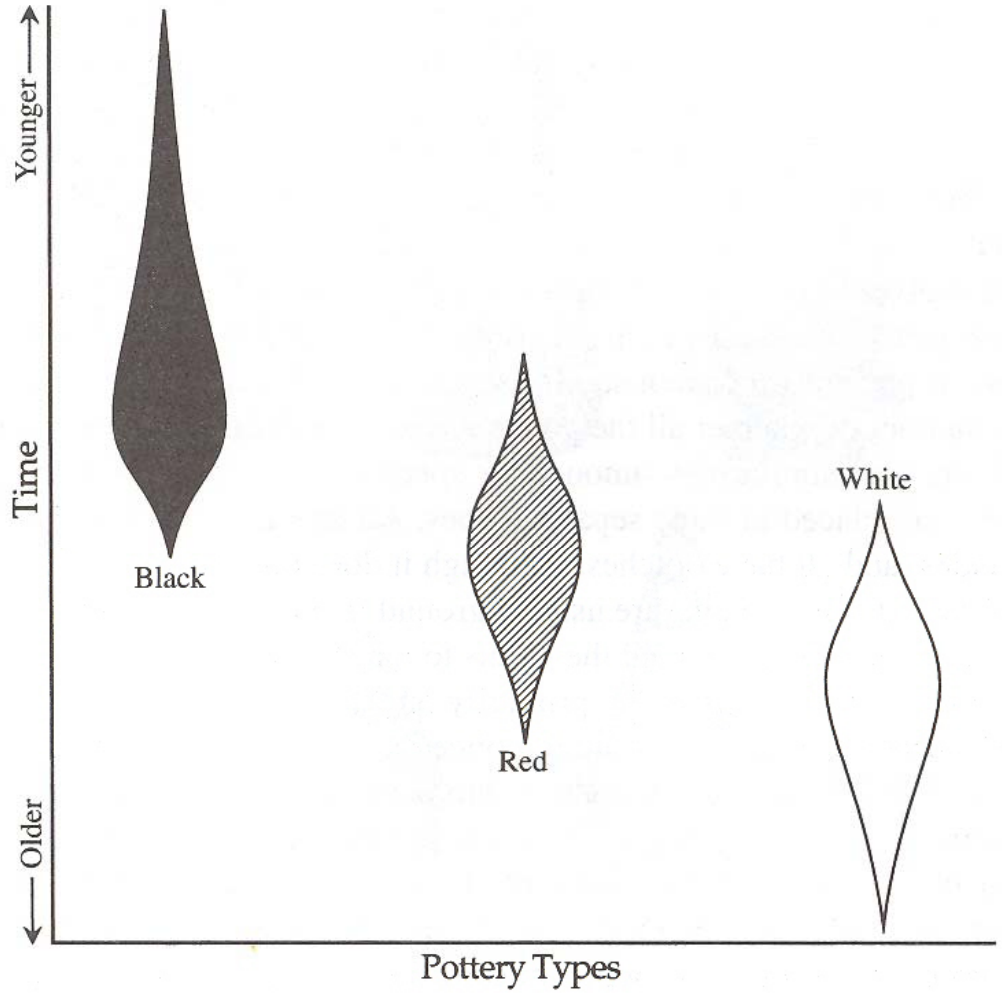
Style

- Styles tend to come in, experience a peak in popularity and disappear
  - Why? *Because selection does not keep these memes in the population*

- Stylistic variation disappears more rapidly than functional variation
  - Types based on styles tend to be good temporal types

Temporal Types & Style

- Why do styles tend to be better temporal types than does functional variation?
  - Short durations
  - Usually one occurrence
  - Highly variable



Temporal types based on stylistic variation tend to have distributions that look like these

A rise, peak, and fall through time

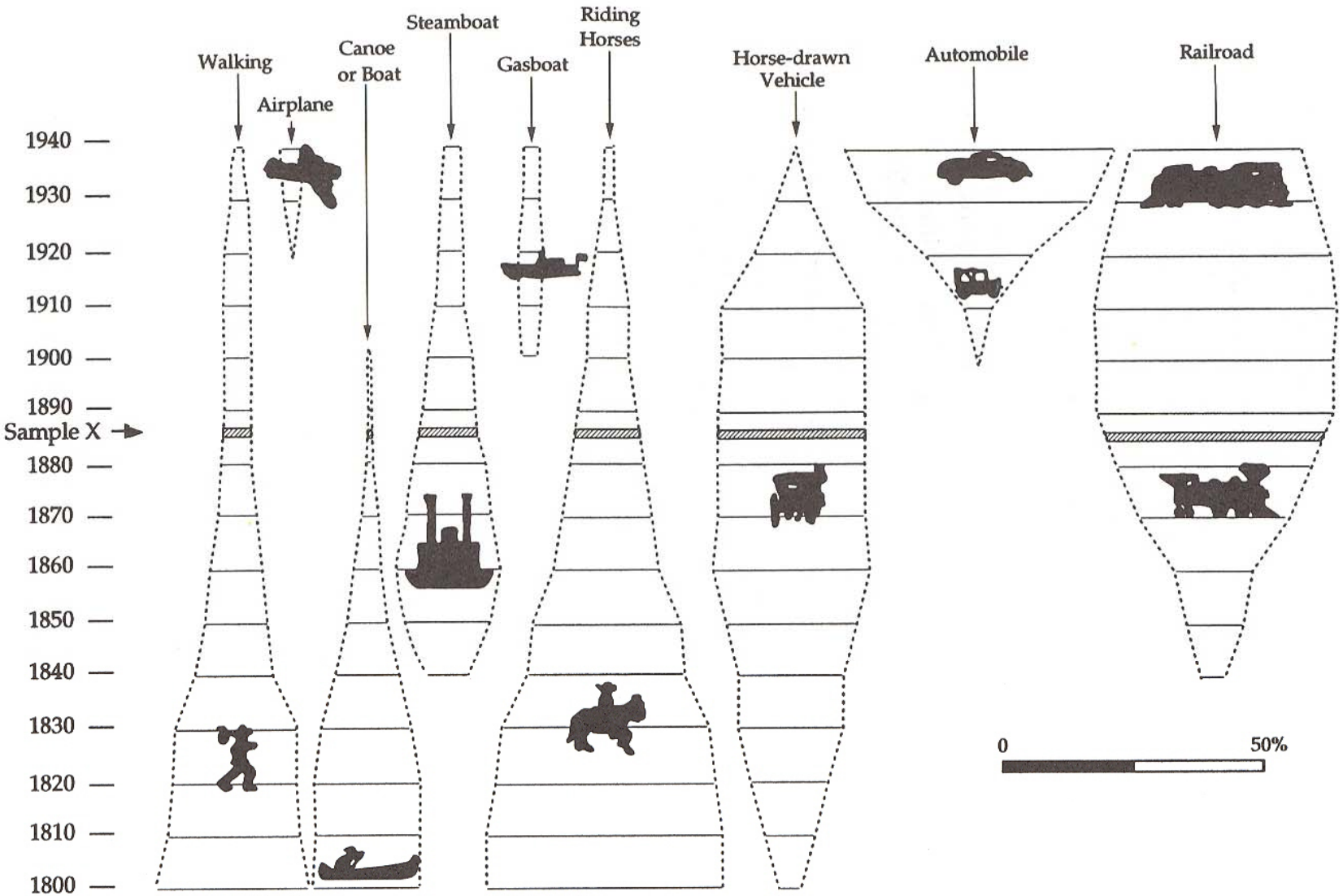
Remember, they tend not to persist because they are not functional and are not selected for

Function

- Functional variation *could* be short in duration, have one occurrence, etc. *but it tends not to*

- Once a meme (and its artifacts) is selected for it tends to persist unless the environment changes

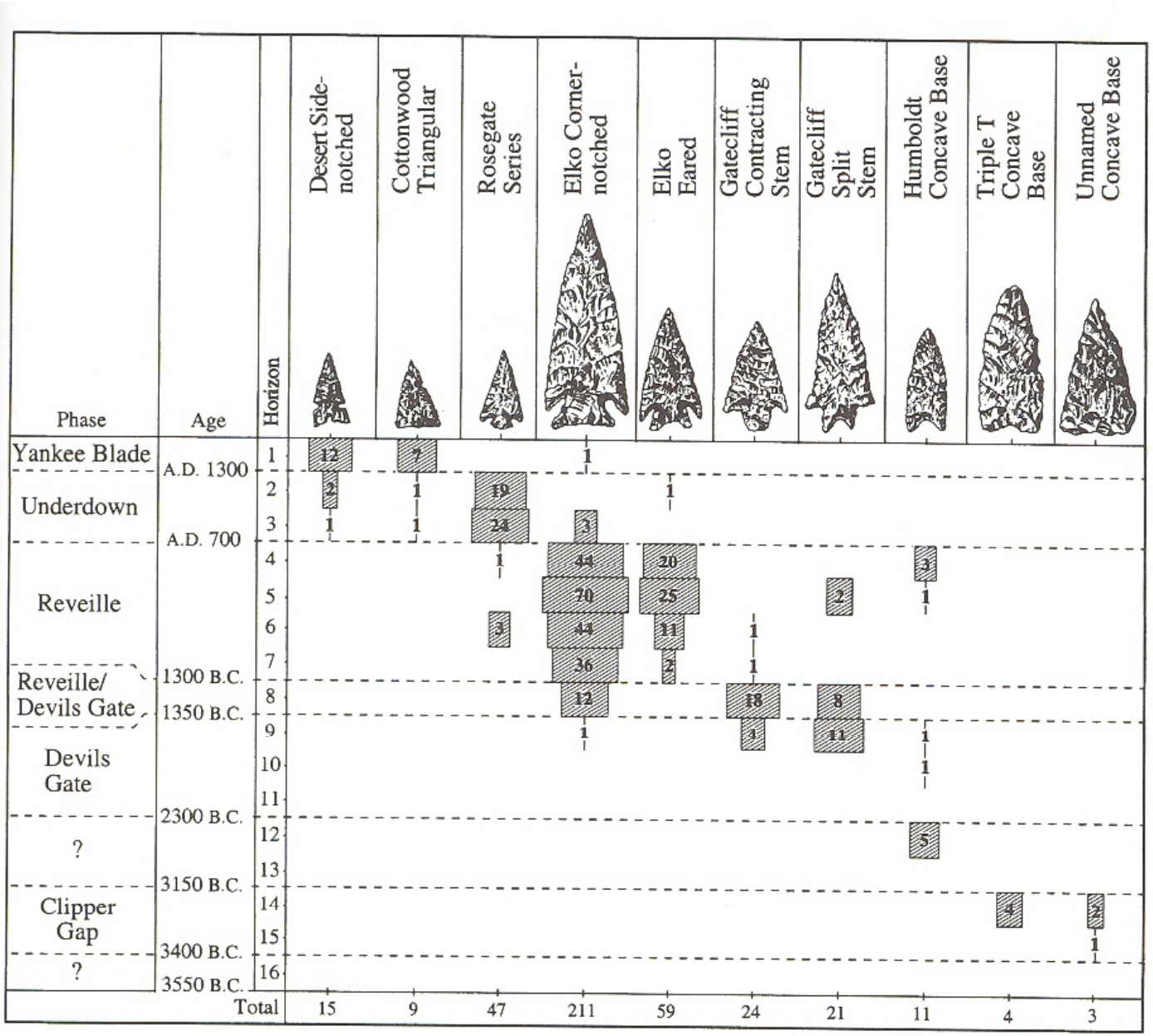
Functional Variation in Transportation: variation persists & may not occur only once



Chronology

- A goal of archaeology is to provide cultural chronology for a region
- Accomplished through use of temporal types
- How we *group* artifacts (memes) is important

We hope to end up with a chronology like this one based on forms of artifacts.



Site chronology

Gatecliff Shelter
Nevada

Periodization

- We tend to create past cultures through periodization
- Take, for example, the Reveille Phase in the Gatecliff chronology
- It has Rosegate, Elko side notched, Elko eared, Gatecliff contracting, Gatecliff stemmed, and Humboldt points.
  - Compare to the Devil's Gate Phase; what is inbetween?
- The phases are actually arbitrary chunks of a continuum; the "cultures" are not real
- But they take on a reality: *Baytown Plain pottery example*

Summary

- Dating allows ordering of cultural change
- Provides the back bone of archaeology
  - Time, space, and form
- Together we use these to trace cultural evolution using
  - Using components, phases, traditions, and horizons
- We will study cultural evolution in three phases
  - Mesa Verde, Hohokam, & Chaco