

# Animal culture



# Consequences of sociality

Animals are exposed to behavior, sometimes novel, of others



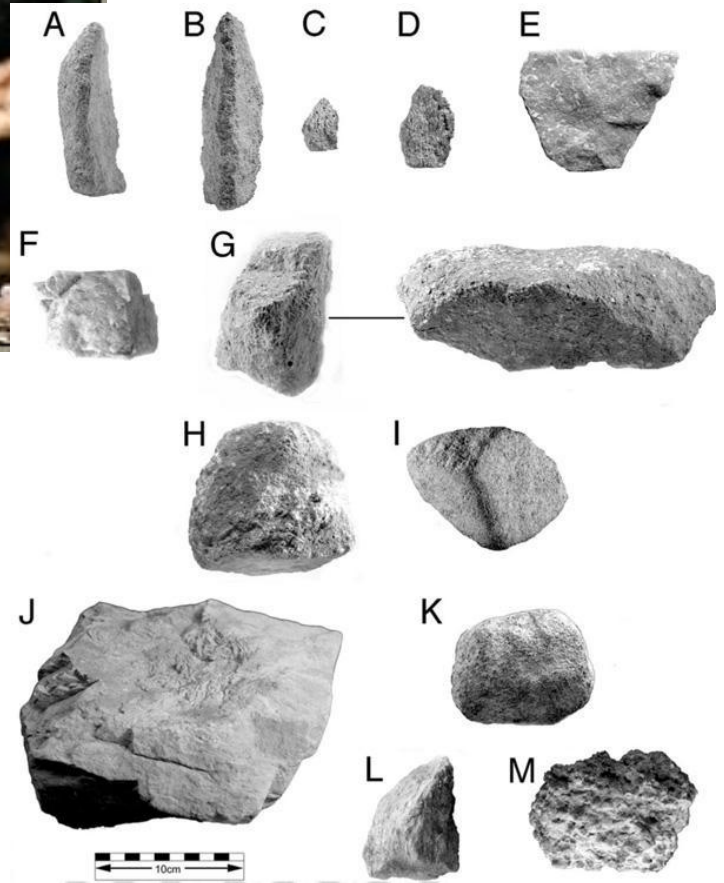
Do animals display culture?

# What is culture?

“The totality of the mental and physical reactions and activities that characterize the behavior of individuals composing a social group collectively and individually in relations to their natural environment, to other groups, to members of the group itself and of each individual to himself” - **Franz Boas** (1911)



“An extrasomatic (nongenetic, nonbodily), temporal continuum of things and events dependent upon symboling. Culture consists of tools, implements, utensils, clothing, ornaments, customs, institutions, beliefs, rituals, games, works of art, language, etc.”  
- **Leslie White** (~1949)



# What is culture?

“Patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups” - **Kroeber and Kluckhohn** (1952)

“Learned systems of meaning, communicated by means of natural language and other symbol systems, having representational, directive, and affective functions, and capable of creating cultural entities and particular senses of reality” - **Roy D'Andrade** (~1984)

“The universal human capacity to classify, codify and communicate their experiences symbolically...a defining feature of the genus *Homo*” - **Wikipedia** (2006)

# Cultural transmission

May occur via copying...

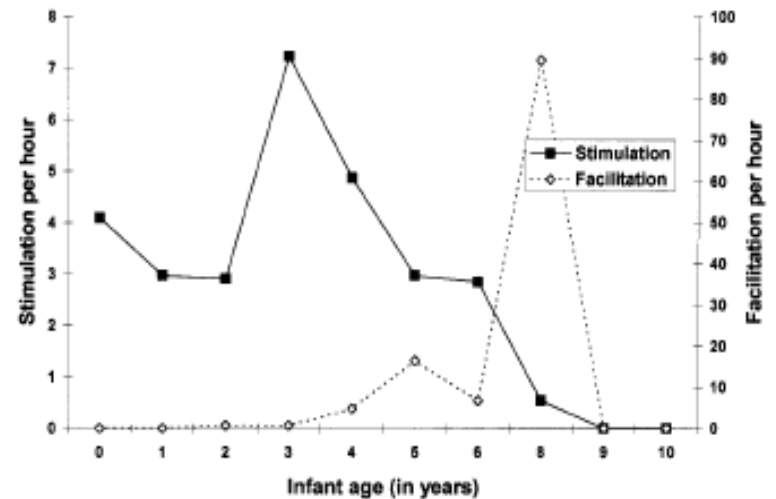


...or via direct instruction



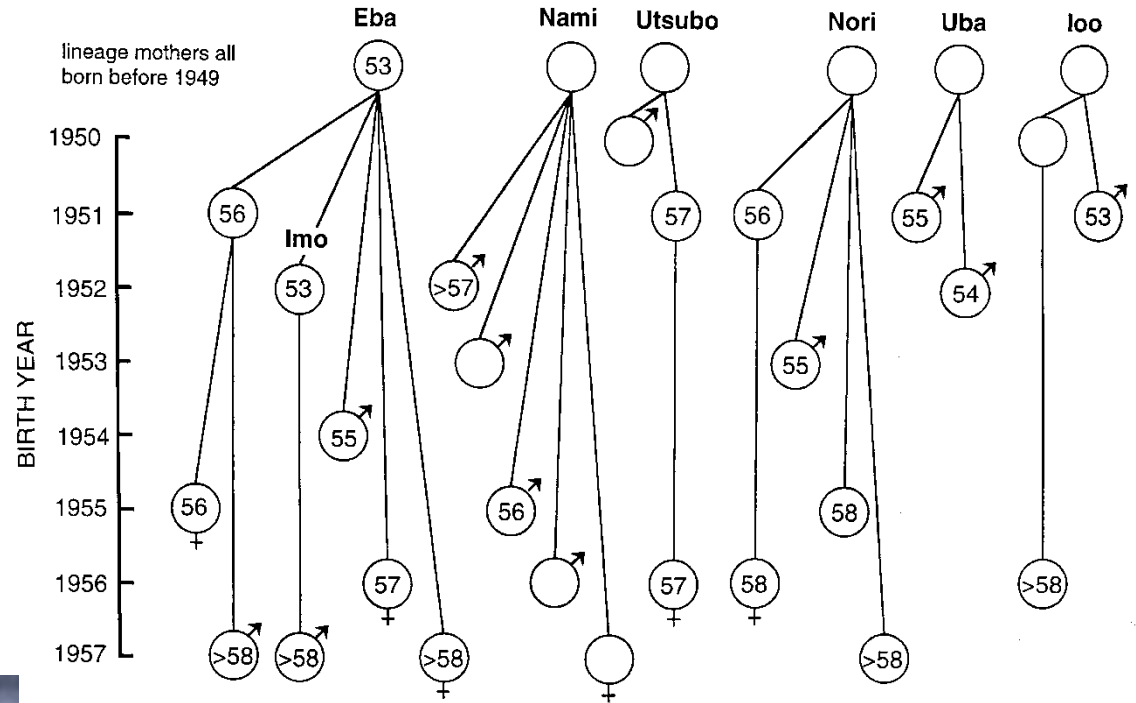
Culturally transmitted behavior must persist beyond life of originator

## Tool use in chimpanzees



# Cultural transmission in macaques

- Macaques on Koshima Island provisioned by humans
- One-year old female named Imo introduces novel behavior

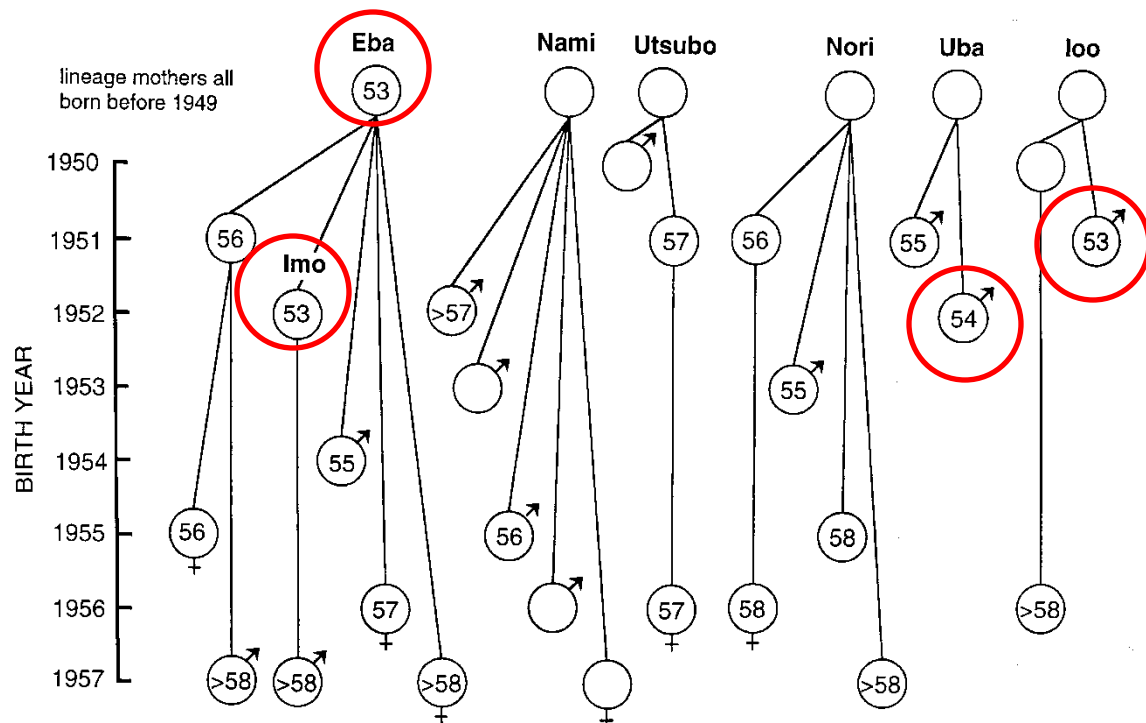


The first year that sweet-potato washing was observed is indicated by the number in the circle; ">" means after the year shown.



# Cultural transmission in macaques

First learners =  
her mother, two  
juveniles



The first year that sweet-potato washing was observed is indicated by the number in the circle; ">" means after the year shown.

Passed mother to offspring  
(imitation and teaching)

In 1956, Imo originated  
another feeding behavior

Mature males  
never learned  
either behavior





# Cultural transmission in macaques



stone-play

1979: one event  
in 14 months of  
observation



1983: habitual  
behavior in  
approximately  
half of the troop

# Cultural transmission in macaques



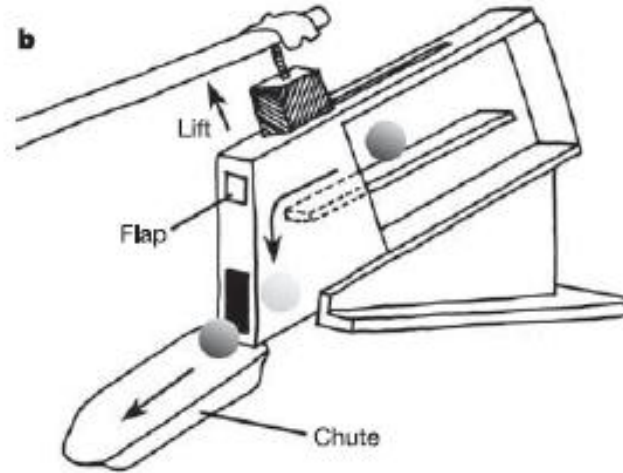
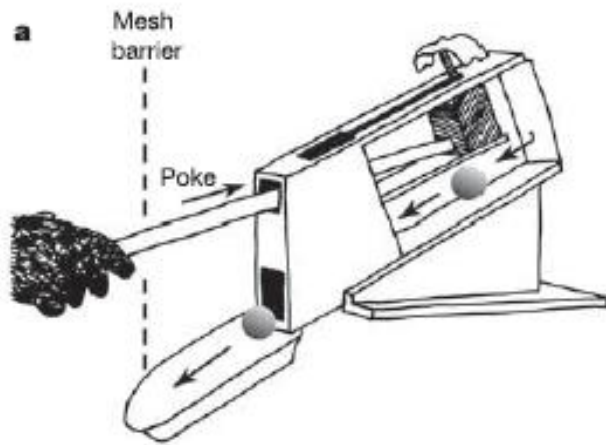
1950s: Japanese diverted river flow to cool hot springs for human use

Colonized by macaques along similar demographic lines



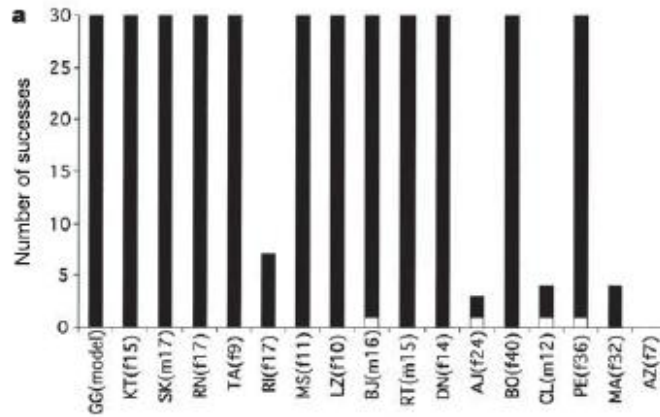
Adult males did eventually learn to use thermal pools

# A culture of conformity?

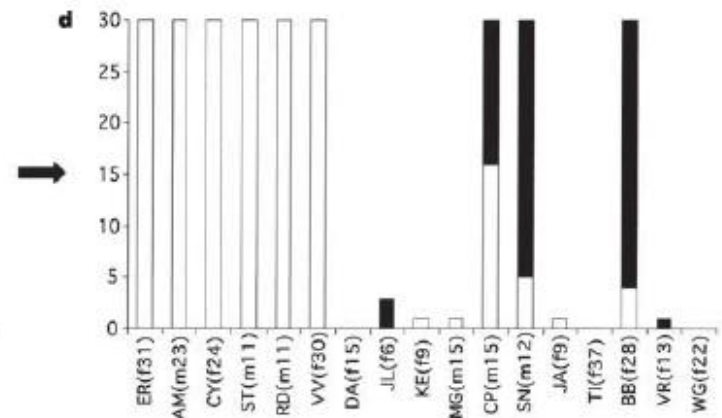
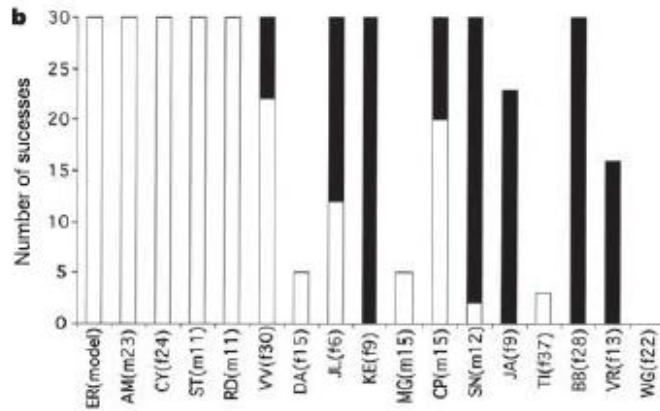
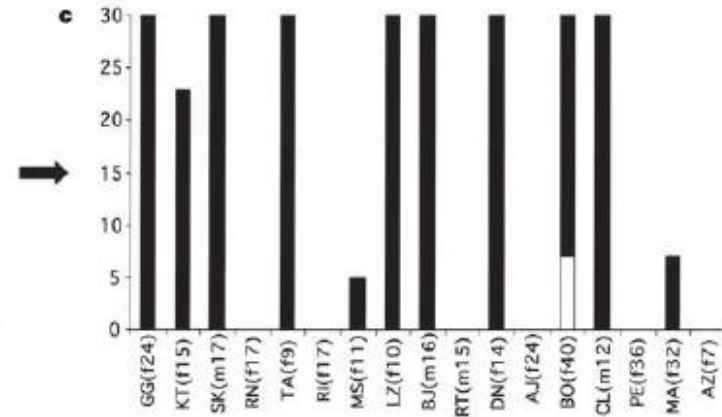


# A culture of conformity?

Within 10 days of first exposure to apparatus

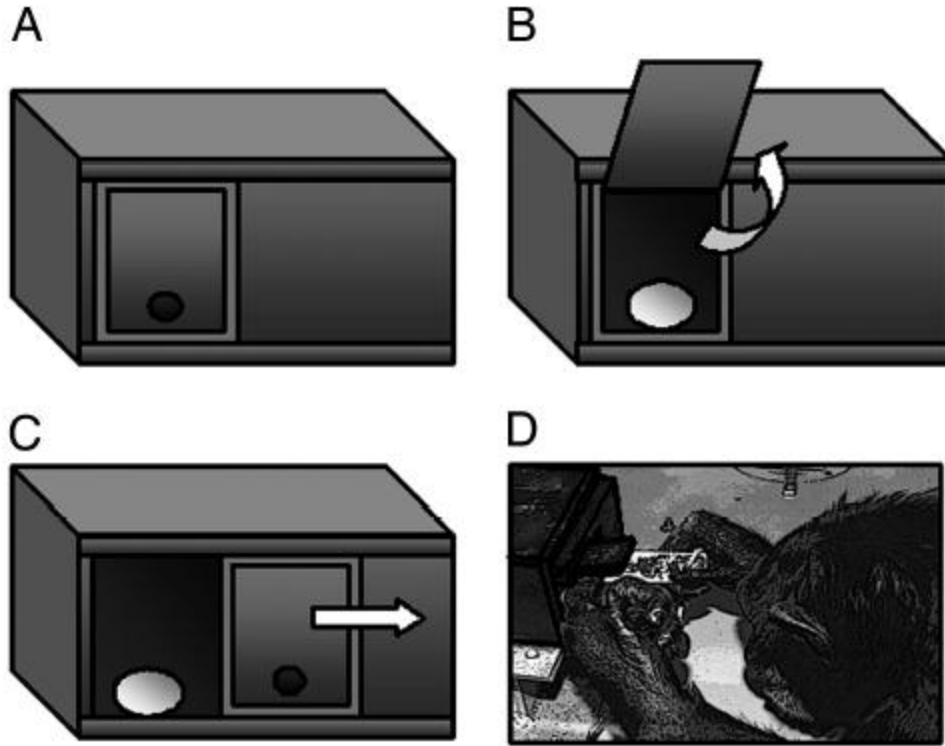


Two months later



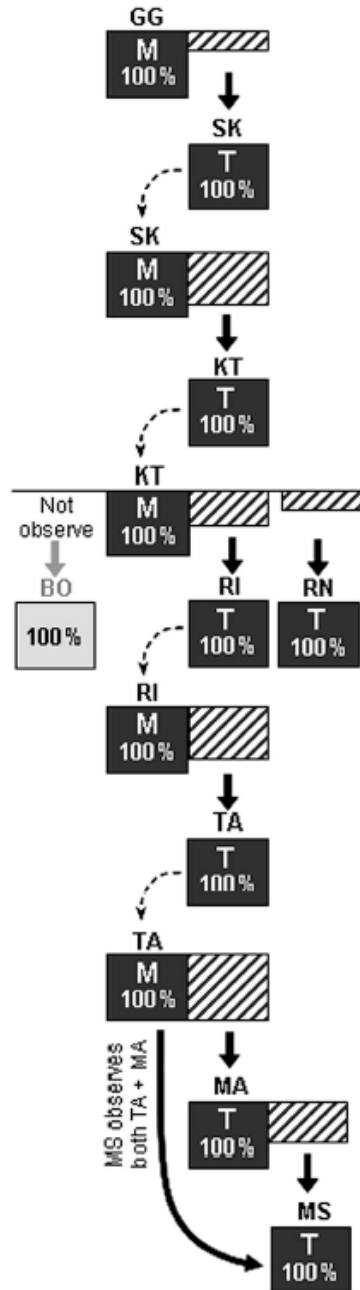
black bars = "poke", white bars = "lift"

# A culture of conformity?

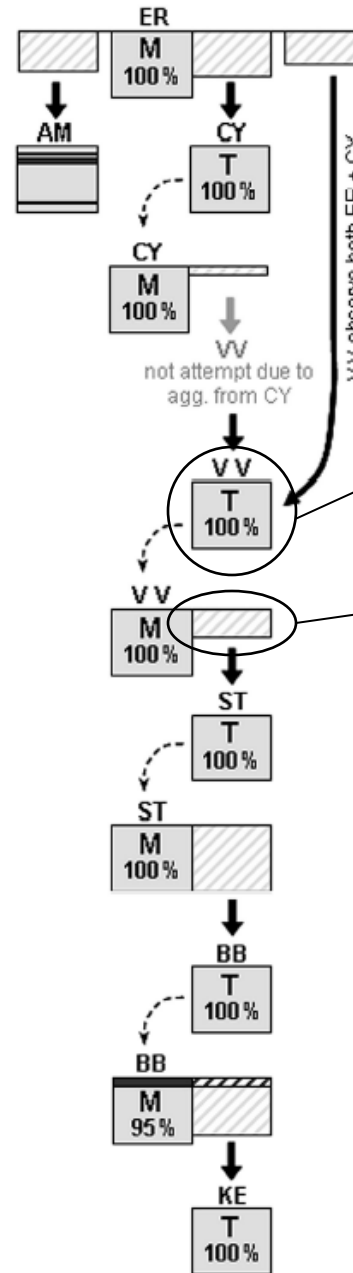


Chimps trained at either  
“lift” or “slide” technique

### FS1



### FS2



Percent of tasks demonstrated of that type

Percent of demonstrations observed

Faithfully transmitted to 5-6 others (lift left, slide right)

In spite others' ability to spontaneously generate (control group)

# Feeding strategies in cetaceans



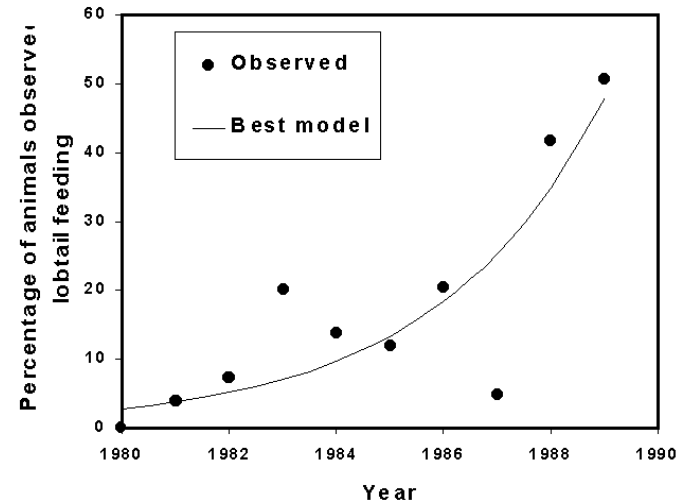
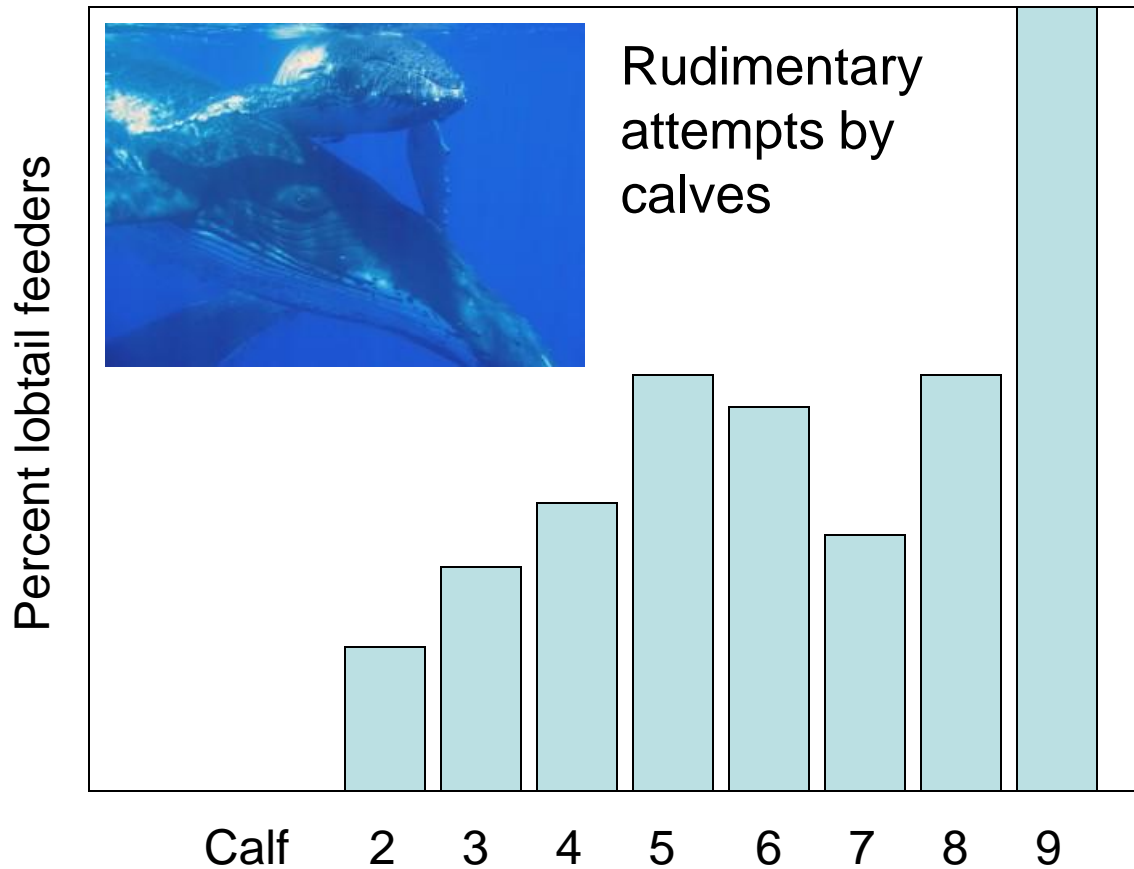
Humpback whales release cloud of bubbles prior to breaching



Dive sometimes preceded by tail slap (lobtail feeding)



# Feeding strategies in cetaceans



Increased lobtail feeding due to diet change from herring to sand lance?





# Feeding strategies in cetaceans



“Sponging” in Shark Bay, Australia  
Occurs within one matriline



Analysis (1 male, 12 females, 172 non-spongers)  
suggests no genetic basis

# Feeding strategies in cetaceans



Same population observed  
“conching” in 2007 and 2009



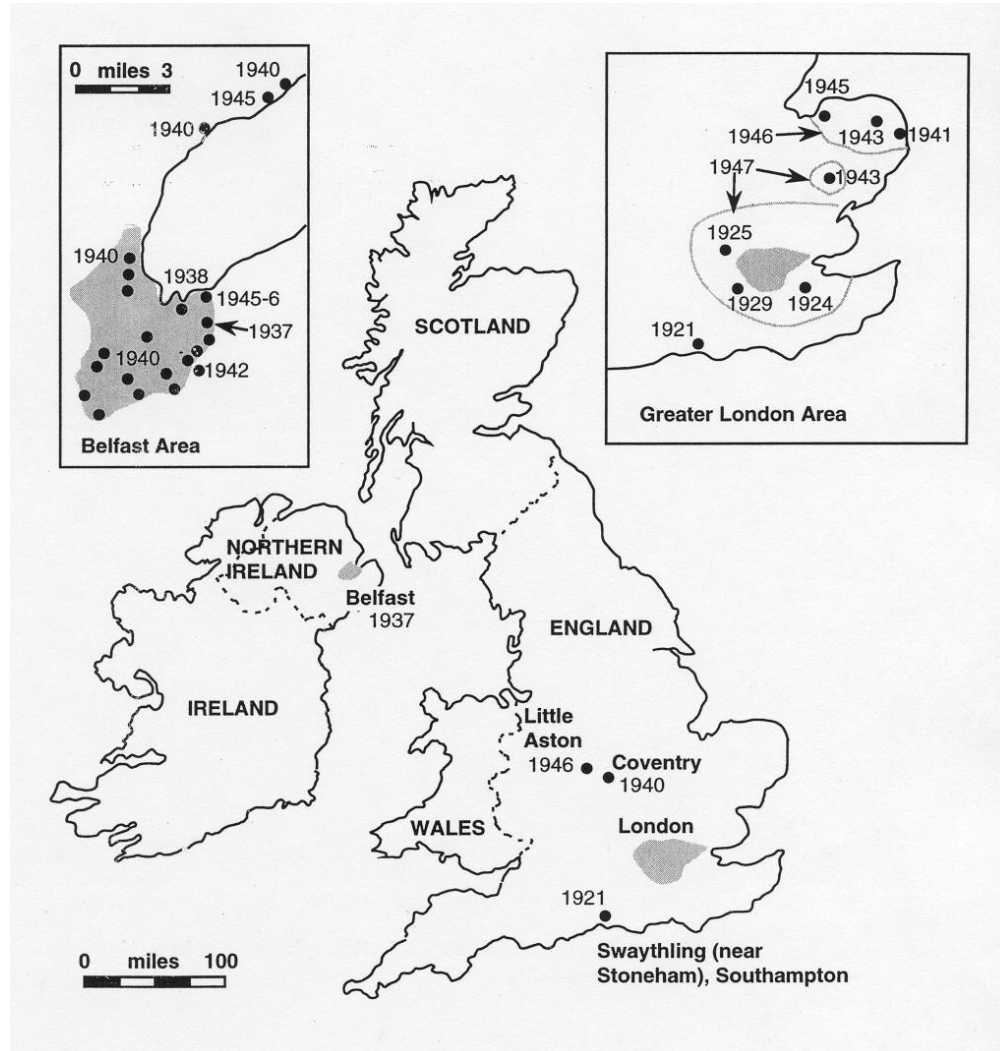
# Feeding strategies in cetaceans



- Recent evidence of another novel feeding strategy in captive orcas
- Pattern of cultural transmission similar

young male → half brother → adult female → adult female → calf → adult male

# Cultural transmission in birds



# Cultural transmission in birds



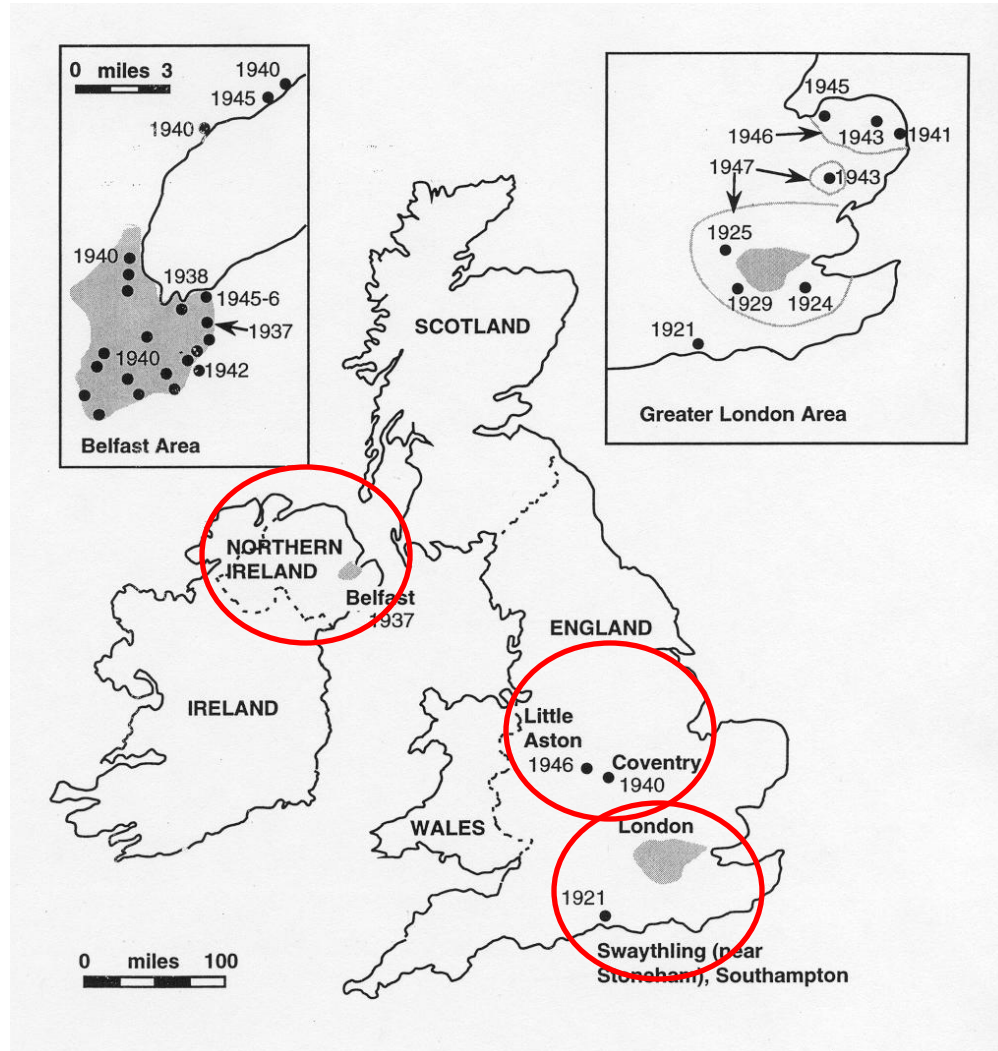
Titmice were the culprits

Null hypothesis: behavior spread not via cultural transmission, but via independent learning events



Chickadees show high rates of spontaneous opening

# Cultural transmission in birds



Evidence suggests three independent origins followed by cultural transmission

# Does cultural transmission make a culture?



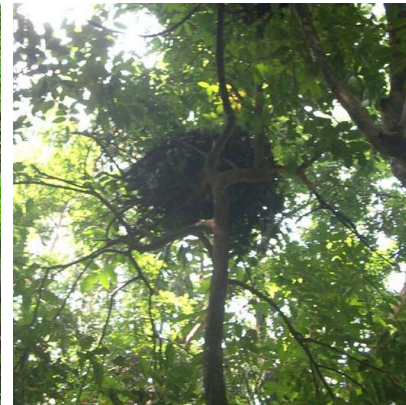
Many species have complex societies, but no culture

- Criteria for culture include
  - Differences among populations
  - Cultural transmission (i.e. social learning)
  - Differences not genetic or purely ecological

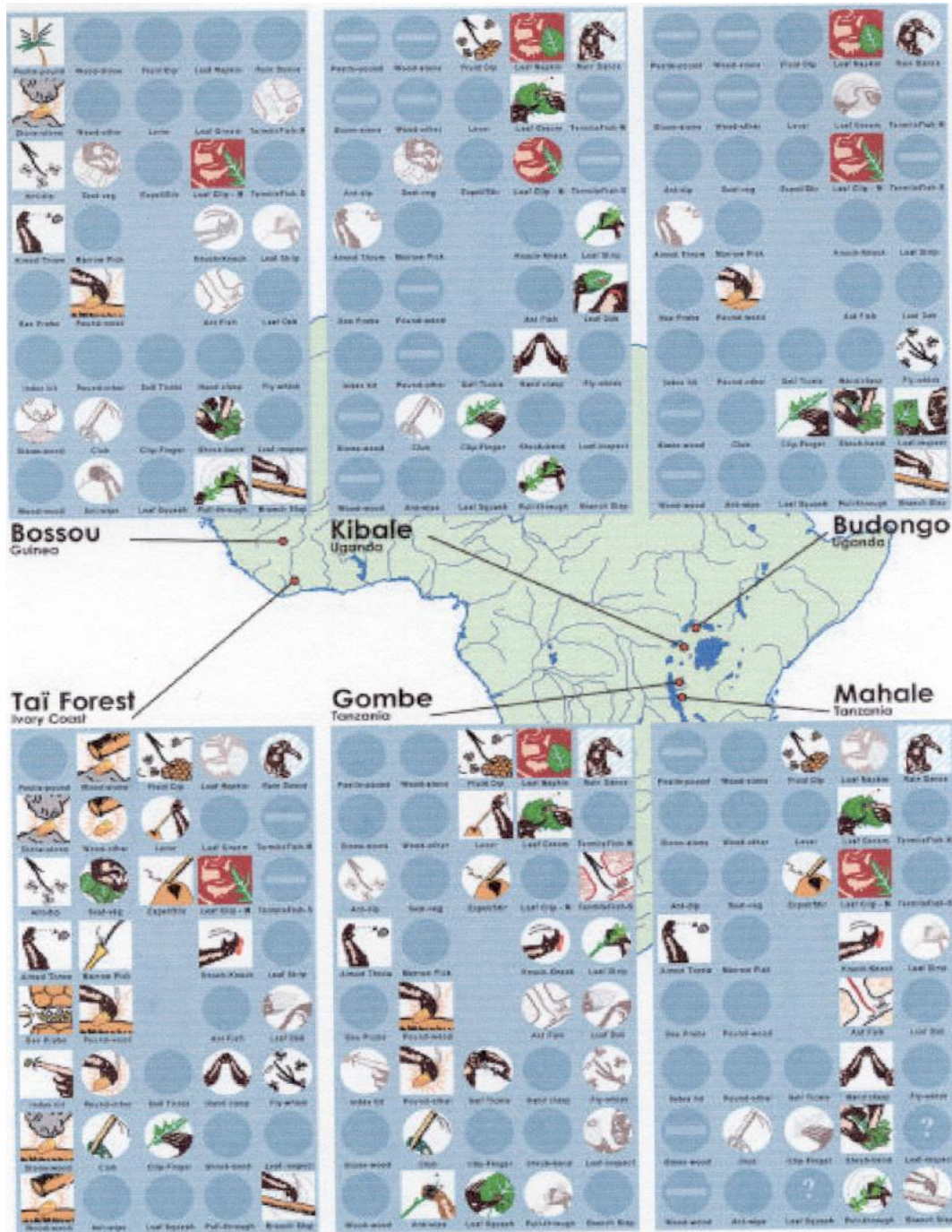


# Culture in great apes: chimpanzees

- Combined 151 years of data (7 sites)
- 39 cultural traditions customary in  $\geq 1$  population, absent in others
- Include tool use, courtship rituals, and grooming techniques
- Excludes ecological differences
  - e.g. nesting in relation to predation risk







colored square > colored circle  
 colored circle > monochrome circle  
 empty circle > empty circle

# Culture in great apes: orangutans

- Similar analysis yielded 24 cultural characters
- Included snag-riding, leaves as gloves and sound amplifiers



# Is culture evolutionarily important?



- Many whales species have low diversity of mitochondrial DNA
- Most pronounced in those with matrilineal social system – suggestive of cultural effect?

# Conclusions regarding animal culture

- Animals undoubtedly transmit behaviors culturally in a manner similar to humans
- Some animals possess cultures similar to our own, though substantially less complex
- Cultural transmission of behavior may be evolutionarily important

So what is culture?

“An animal tradition that rests either on tuition of one animal by another or on imitation by one animal of acts performed by another” - **Galef** (1992)

