

Cognitive processes in animals, especially primates.

- Whereas ethologists and behaviourists used to explain animal behaviour in terms of reflexes, it is common now to talk of animal cognition.
- The great apes are more closely related to the human species than other animals, and might thus be expected to have more human-like cognition.
- But hard evidence for this is weak, and some authors reject this idea (Macphail, 1987; Heyes, 1998).

Primate Cognitive Superiority?

- An extreme case of this notion was the expectation that, with sufficient training, infant apes would develop linguistic competence. (E.g. Gardener and Gardener, 1969).
- There is now a wide consensus that what chimpanzees achieve, even after years of training, merely emphasizes the importance of inherited human specialized capacities.

Human-like capacities other than language

- Piagetian tests suggest that ape infants go through similar stages to human infants at least during the sensori-motor period (1st year).
- Imitation and social learning may be primate characteristics.
- Tool using occurs in some populations
- Memory for recent events in primates may be very extensive (Menzel, 1973).

Mental attribution and “Theory of Mind”

- Self-recognition in mirrors seems to only occur in apes.
- It is suggested that this indicates a broader capacity for introspection and for attributing mental states to other individuals (Gallup *et al*, 1995; Boysen and Himes, 1999).
- Povinelli (1993) reviews this suggestion, but others such as Heyes (1998) are sceptical even about self-recognition.



genome.gov

National Human Genome Research Institute

Take the
genome.gov
survey!

Newsroom

[Current News Releases](#) › **Chimp Genome Assembled by Sequencing Centers**



NIH NEWS ADVISORY

National Institutes of Health

National Human Genome Research Institute

Chimp Genome Assembled by Sequencing Centers

Draft Sequence Aligned With Human Genome

BETHESDA, Md., Dec. 10, 2003 - The National Human Genome Research Institute (NHGRI), one of the National Institutes of Health (NIH), today announced the first draft version of the genome sequence of the chimpanzee and its alignment with the human genome. All of the data have been deposited into free public databases and are now available for use by scientists around the world.

DNA similarities

- human to yeast about 30%
- human to worm about 40%
- human to banana about 50%
- human to fruit fly about 60%
- human to mouse about 90%
- human to rhesus monkey about 93%
- human to chimp about 98.4%
- human to human about 99.9%
- identical twins, 100% identical

Tool use in wild chimpanzees

- Since 1987 in Guinea in West Africa, observations have been being made in the centre of free-range area, where experimenters provide stones and nuts.
- Inoue-Nakamura, N, & Matsuzawa, T (1997) Development of stone tool use by wild chimpanzees (*Pan troglodytes*). *Journal of Comparative Psychology*, Vol.111, No.2, Pp.159-173.

Tool use in wild chimpanzees

Nut cracking consists of the following actions:

- (a) picking up a nut
- (b) putting it on an anvil stone
- (c) holding a hammer stone
- (d) hitting the nut with the hammer stone
- (e) picking up and eating the nut kernel.

Tool use in wild chimpanzees

- The individual actions of ‘Take’, ‘put’ ‘hold’, ‘hit’ and eat, had all been performed by 1.5 yrs
- At 2.5 they often put a nut on a stone, hit it with the back of their hand, then picked up a kernel from somewhere else or scrounged a kernel from their mothers
- Holding the hammer was the a difficult part – chimps never hit nut with the hammer stone until the last stage

Tool use in wild chimpanzees

Discussion

- “True imitation cannot explain the results of the present study”
- As the present results suggest, they learned the general functional relations of stones and nuts
- and also learned the goals obtained by the demonstrator
- This learning process might be called emulation

Spoon Gwa



The ape seldom spills her food in eating with a spoon, while the child is more inclined to turn the spoon over as he places it in his mouth, frequently losing much of the contents. Ages: Donald 18½ months, Gua 16 months.

Primate Cognitive Superiority?

- An extreme case of this notion was the expectation that, with sufficient training, infant apes would develop linguistic competence. (E.g. Gardner and Gardner, 1969).
- There is now a wide consensus that what chimpanzees achieve, even after years of training, merely emphasizes the importance of inherited human specialized capacities.

Attempts at Language Training

<i>Method</i>	<i>Names of chimps</i>	<i>Names of psychologists</i>
American Sign Language (ASL)	Washoe, Austin & Sherman Kanzi Nim Chimpsky	Gardner and Gardner (1969) Savage- Rumbaugh Terrace <i>et al</i> , 1979
Plastic tokens	Sarah (& others)	Premack (1971, '76 & '86)
“Lexigrams”: visual symbols on a screen	Austin & Sherman, + others	Greenfield and Savage- Rumbaugh (1993)

Vicki (Hayes & Hayes, 1951)

- Vicki died when 7
- Lots of imitation, throws and catches balls, cuts paper with scissors, opens doors, flips light switches
- At 5.5 spontaneous sorting of e.g. nuts bolts screws and washers without error
- Conclusion was that Vicki had rudimentary *higher mental functions*
- **But** she had only 4 “spoken words” mama, papa up and cup plus 3 spontaneous sounds

Terrace, H.S. (1979/1980) *Nim*. London: Eyre Methuen.

Terrace, H.S., Pettito, L.A., Sanders, R.J. and Bever, T.G. (1979) Can an ape create a sentence? *Science*, 206, 891-902.

The project lasted 4 years and involved 60 teachers, mostly volunteers. Another group of about 40 volunteers tabulated and analyzed data from daily records and videotapes.

In the *Science* paper more than 19,000 “multi-sign utterances” were analyzed for syntactic and semantic regularities.

Terrace, H.S. (1979/1980) *Nim*. London: Eyre Methuen.

Terrace, H.S., Pettito, L.A., Sanders, R.J. and Bever, T.G. (1979) Can an ape create a sentence? *Science*, 206, 891-902.

The project lasted 4 years and involved 60 teachers, mostly volunteers. Another group of about 40 volunteers tabulated and analyzed data from daily records and videotapes.

In the *Science* paper more than 19,000 “multi-sign utterances” were analyzed for syntactic and semantic regularities.

There were some regularities, but videotape analyses showed that most of Nim's utterances were prompted by his teacher's prior utterances (signs in American Sign Language).

Nim interrupted his teachers to a much larger extent than a child interrupts an adult's speech.

Typical four-sign combinations were —

Nim 5 p. 7

“eat drink eat drink” (15)

“eat Nim eat Nim” (7)

“banana Nim banana Nim” (5)

“drink Nim drink Nim” (5)

“banana eat me Nim” (4)

“banana me eat banana” (4)

“banana me Nim me” (4)

“grape eat Nim eat” (4)

“Nim eat Nim eat”

“play me Nim play”

“drink eat drink eat” (3)

“drink eat me Nim” (3)

- Jensvold, M. L. A., & Gardner, R. A. (2000). Interactive use of sign language by cross-fostered chimpanzees (*Pan troglodytes*). *Journal of Comparative Psychology*, 114(4), 335-346.
- NB. an 'X' following a sign indicates an immediate repetition of the sign; a '?' indicates an ASL version of questioning inflection, and a '/' indicates the ASL inflection corresponding to the end of an utterance.

Washoe 2000

- Trial #3 (page 337) Example 1 in lecture
- 1:04:35 Washoe: ME GIMMEX/
- 1:04:40 Probe 1: questioning expression
- 1:04:41 Washoe GIMME/
- 1:04:49 Probe 2 WHAT?/
- 1:04:51 Washoe MEX GIMMEX/
- 1:04:54 Probe 3 NOT UNDERSTAND?
- 1:04:56 Washoe FOOD GIMME/
- End of trial

Washoe 2000 - 2

- Trial #5 (page 338) Example 2 in lecture
- 0:08:46 Washoe: FRUIT GIMMEX/
- 0:08:49 Probe 1: WHO FUNNY?
- 0:08:51 Washoe ROGER/
- 0:08:54 Probe 2 WHERE CAT?/
- 0:08:56 Washoe ROGER GIMMEX/
- 0:09:03 Probe 3 WHERE CAT?
- 0:09:05 Washoe GIMMEX/
- End of trial

“Conversations” 2002

- Bodamer, M. D., & Gardner, R. A. (2002). How cross-fostered chimpanzees (*Pan troglodytes*) initiate and maintain conversations. *Journal of Comparative Psychology*, 116(1), 12-26
- NB. an 'X' following a sign indicates an immediate repetition of the sign; a '?' indicates an ASL version of questioning inflection, and a '/' indicates the ASL inflection corresponding to the end of an utterance.

“Conversations” 2002 - 2

- Tatu: PERSON TIME/
- Probe 1: WHAT?/
- Tatu: FOOD TIME FOOD TATU/
- 2. “On topic”.
- *Example*
- Tatu: TIME/
- Probe 2: WHAT TIME?/
- Tatu: FOOD TIME FOOD/

- 4. Denial
- *Example*
- Washoe: FLOWER GIMME FLOWER
FRUIT FLOWER HUG HURRY/
- Probe 2: NO SORRY CAN'T/
- Washoe: FLOWERX/

Mental attribution and “Theory of Mind”

- Self-recognition in mirrors seems to only occur in apes.
- It is suggested that this indicates a broader capacity for introspection and for attributing mental states to other individuals (Gallup *et al*, 1995; Boysen and Himes, 1999).
- Povinelli (1993) reviews this suggestion, but others such as Heyes (1998) are sceptical even about self-recognition.

Conclusion

- Many aspects of human cognition are unique.
- The capacity for language is one of the most important.
- Other aspects of human cognition, such as object recognition, may be found in many other species.
- Many authors believe that the great apes, particularly chimpanzees, exhibit more human-like cognition particularly in the area of social learning.