

Lecture 2: Animal Communication

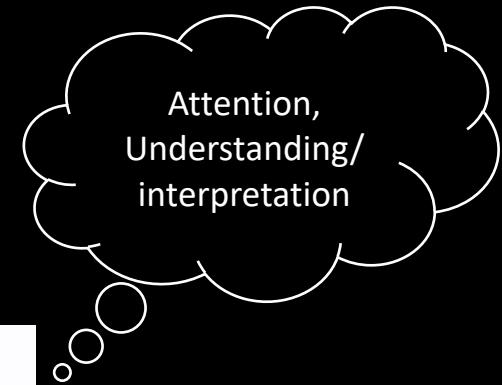
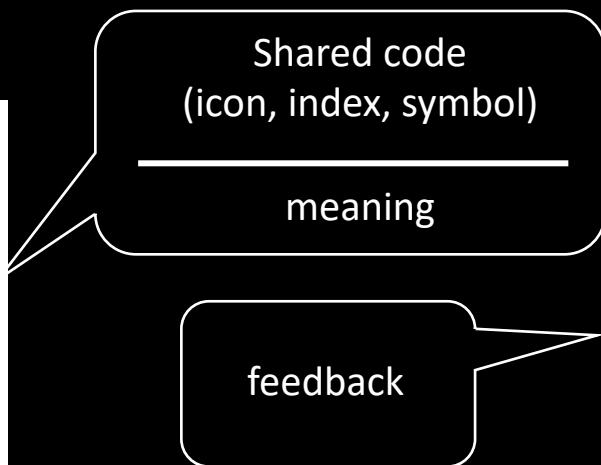
Cognition and Communication, Monday, Sep. 6th 2021

Kristian Tylén

Agenda

- Recap of the nature of human communication
- Why care about animal communication?
- Animal signals
- Primate communication
 - How do primates communicate in the wild?
 - How much can they learn?
 - Kanzi the bonobo – a special case ?
- The difference that makes a difference?
 - What are the critical cognitive prerequisites for the evolution of human language?

Recap: the act of communication



Why care about animal communication?

- The comparative approach: We want to know more about the nature of human language and how it is related to cognition
- Two complementary perspectives on language
- The synchronic¹ perspective:
 - The study of different forms of animal communication can tell us something about how language is special
- The diachronic² perspective:
 - Language is likely to have evolved from other means of communication. Animal communication systems might give us a clue to earlier stages in language evolution

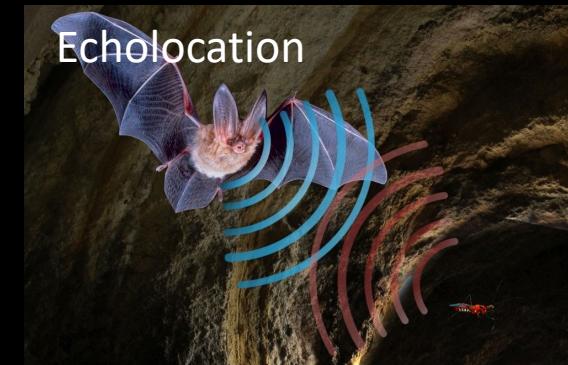
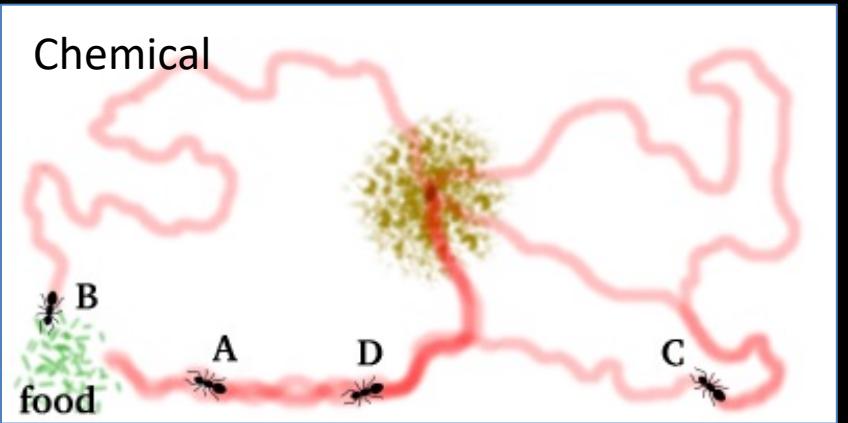
¹ considering differences from a non-temporal stance or in one point in time

² considering the development over time (language change, language evolution)

The nature of animal communication systems

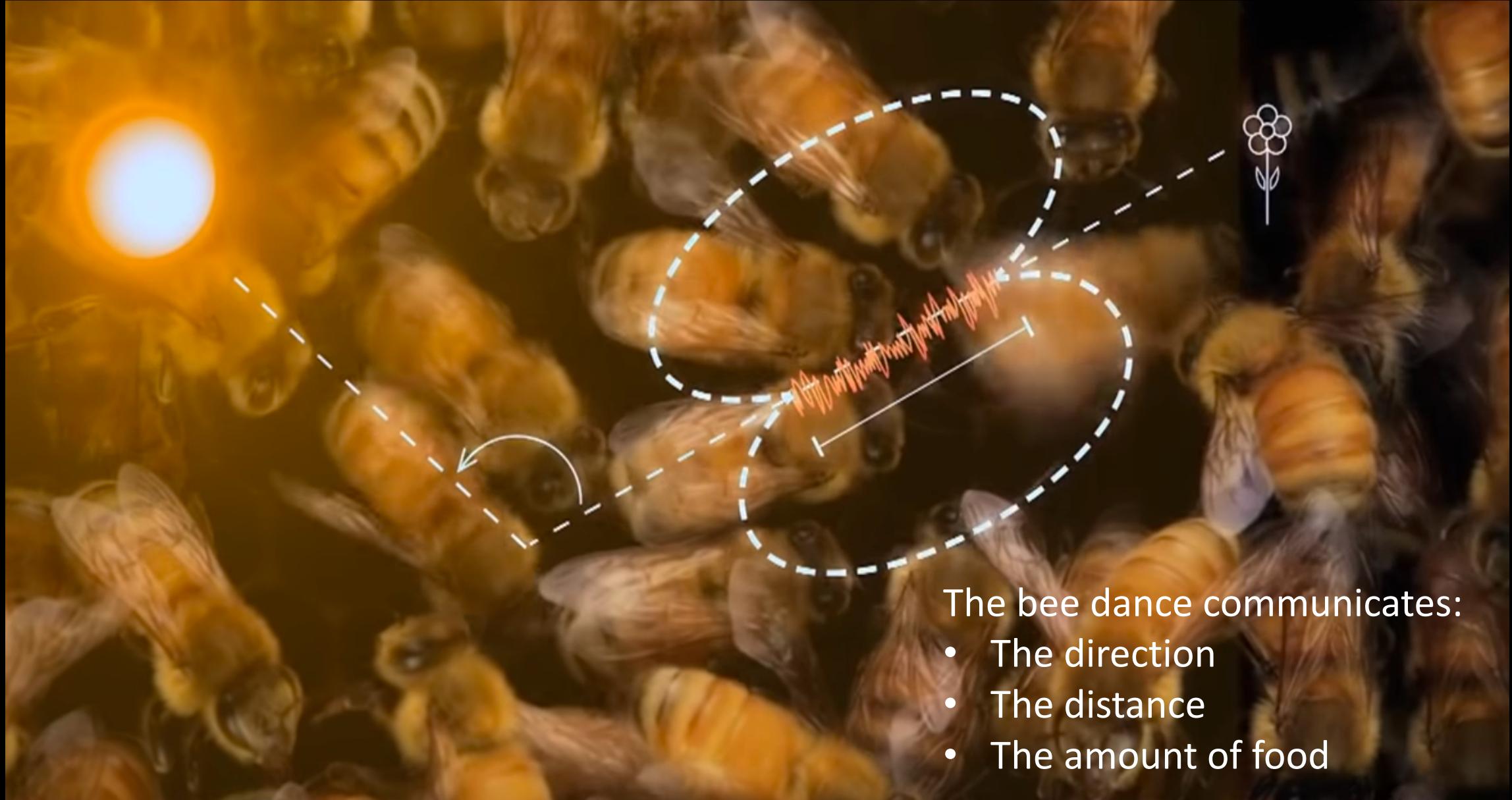
- A few relevant dimensions for comparison*:
 - Intentionality
 - ... part of an innate (instinctual) or learned behavioral repertoire?
 - Flexibility
 - ... can the complex communicative abilities be applied outside very specific contexts?
 - Expressivity
 - ... how much can the animal communicate about? How rich a system is it?
 - Structure
 - ... is it a productive system: can signs be combined to express new meanings?

* See also Charles F. Hockett's basic design features of human language: https://en.wikipedia.org/wiki/Hockett%27s_design_features



Honeybee communication





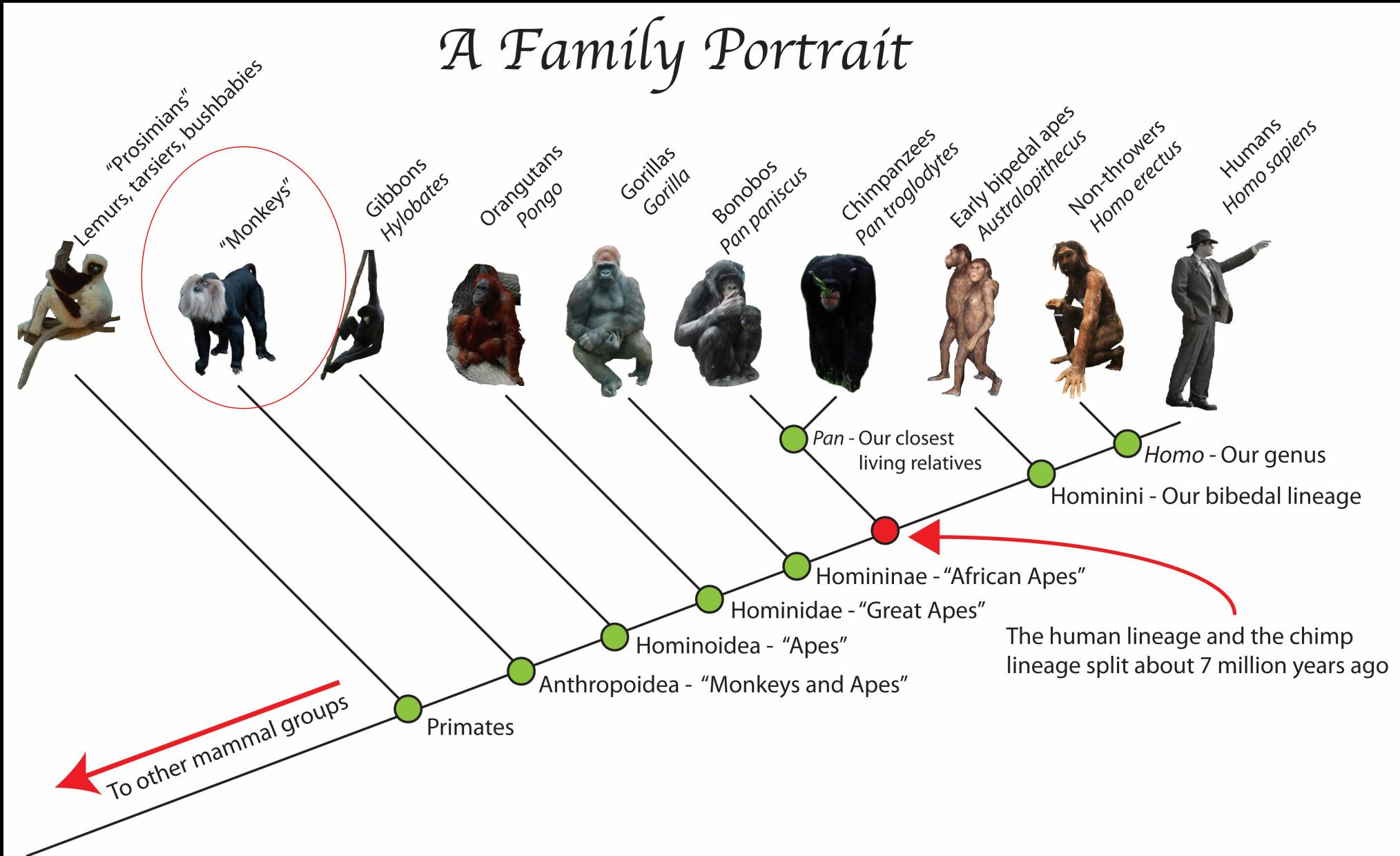
The bee dance communicates:

- The direction
- The distance
- The amount of food

Killdeer - pretence



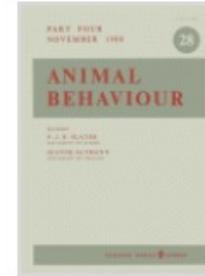
A Family Portrait





Animal Behaviour

Volume 28, Issue 4, November 1980, Pages 1070-1094



Vervet monkey alarm calls: Semantic communication in a free-ranging primate

Robert M. Seyfarth, Dorothy L. Cheney, Peter Marler

Vervet monkey alarm calls

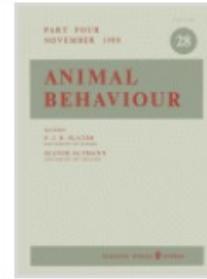


ROBERT SEYFARTH
Can Monkeys Talk?



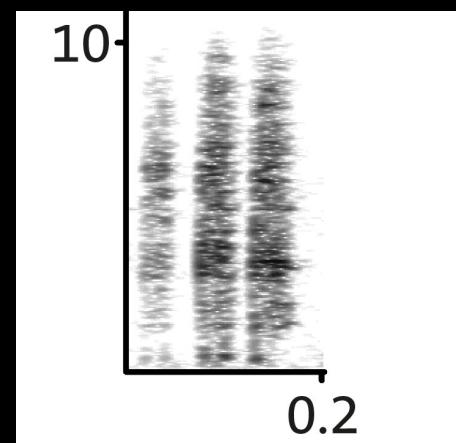
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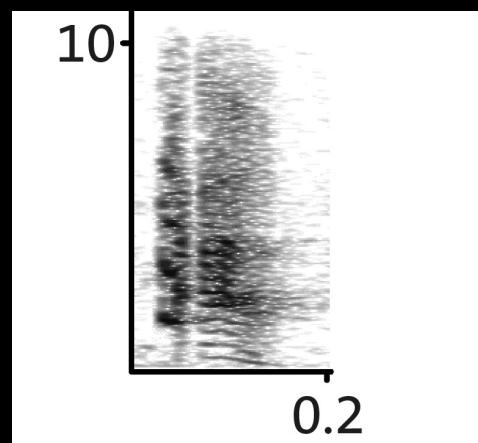


Vervet monkey alarm calls: Semantic communication in a free-ranging primate

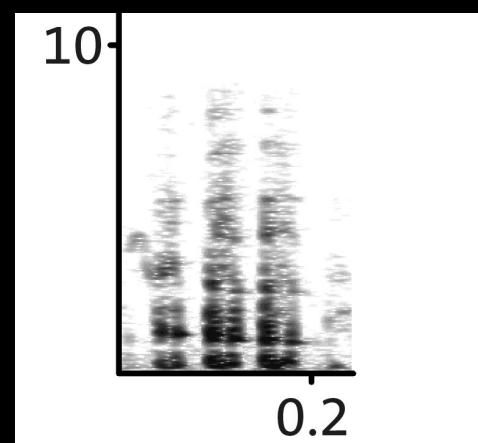
Robert M. Seyfarth, Dorothy L. Cheney, Peter Marler



snake

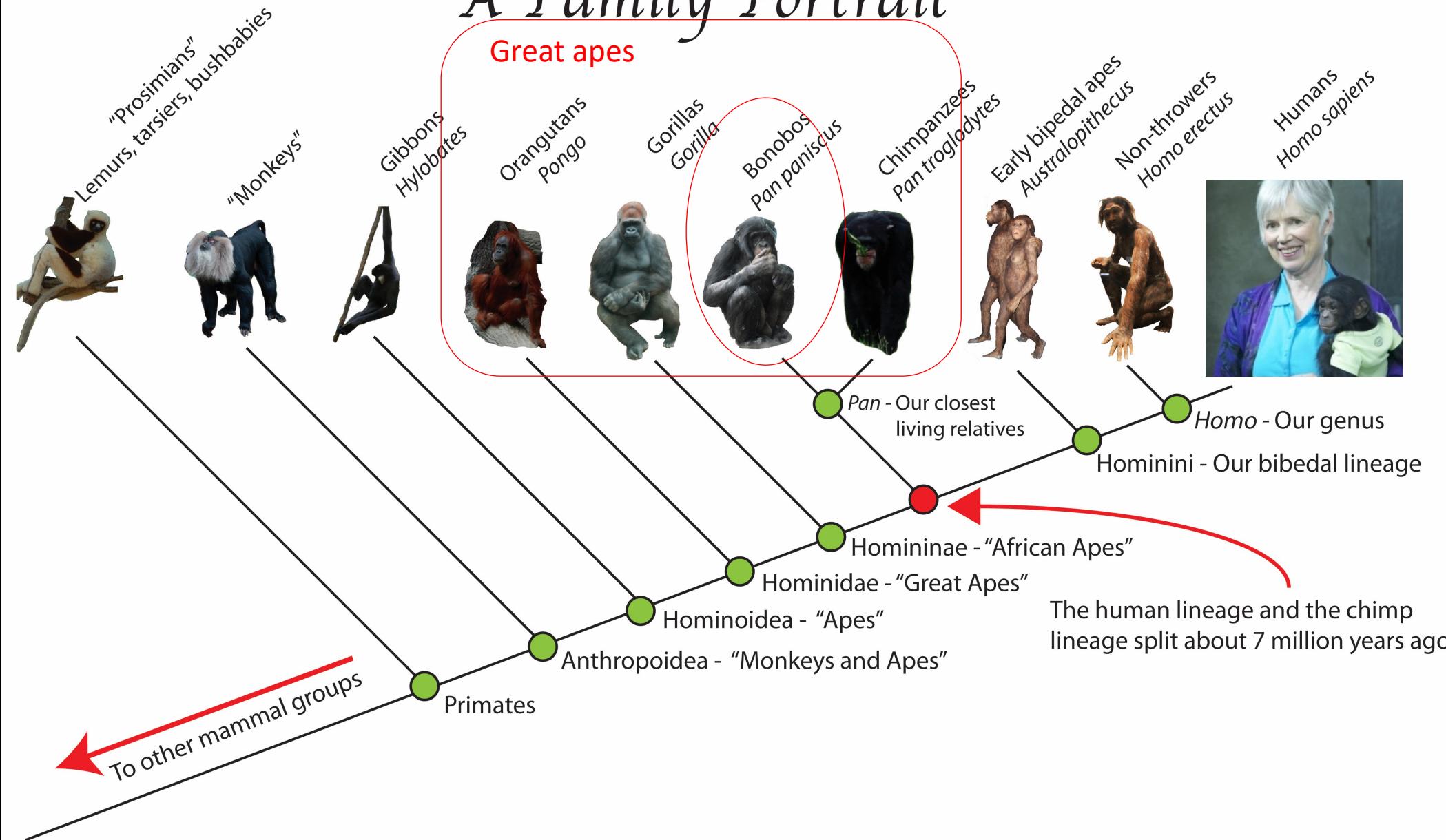


leopard



eagle

A Family Portrait



Great ape language “in the wild”

- We evolved from the great apes
- We share 95 – 98% of our genetic material with the bonobo pygmy chimpanzees
- They are very social – live in colonies of ~ 30 individuals
- How do bonobos interact in the wild?
 - vocal grunts, gestures / bodily expressions / grooming
 - they play
 - They negotiate complex social structures/organization
 - mourn their dead
 - display curiosity
 - show empathy and respect towards other species





PAPER

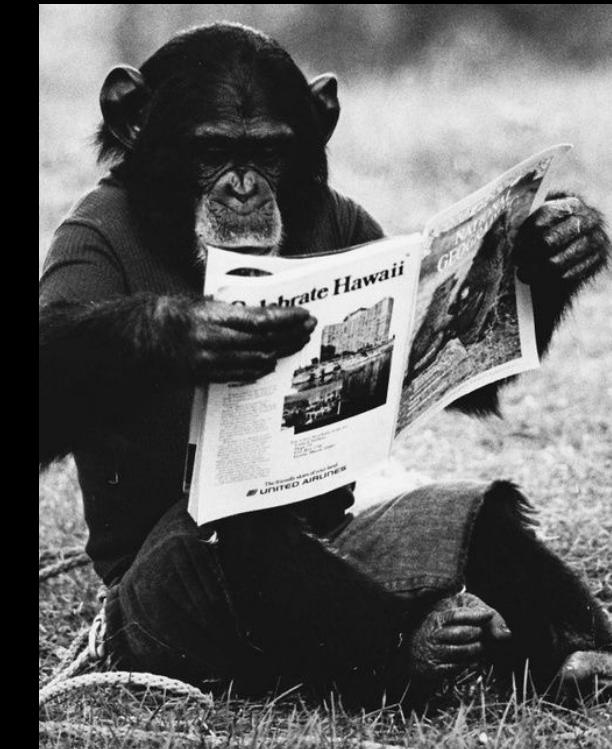
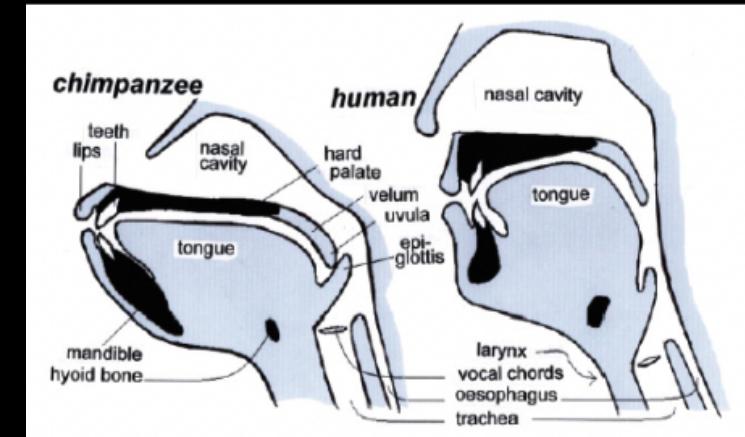
The ontogeny of intentional communication in chimpanzees in the wild

Marlen Fröhlich✉, Roman M. Wittig, Simone Pika✉

- ”(...) Overall, we found that gestures and bimodal signal combinations were most commonly accompanied by markers of intentional communication: audience checking, persistence to the goal, and sensitivity to recipient’s attentional state.
- Within individuals, the proportion of communicative behaviours associated with goal persistence and sensitivity to attention increased with age. Cross-sectional comparisons between infants revealed an age effect on the use of audience checking.” (2018, p. 1)

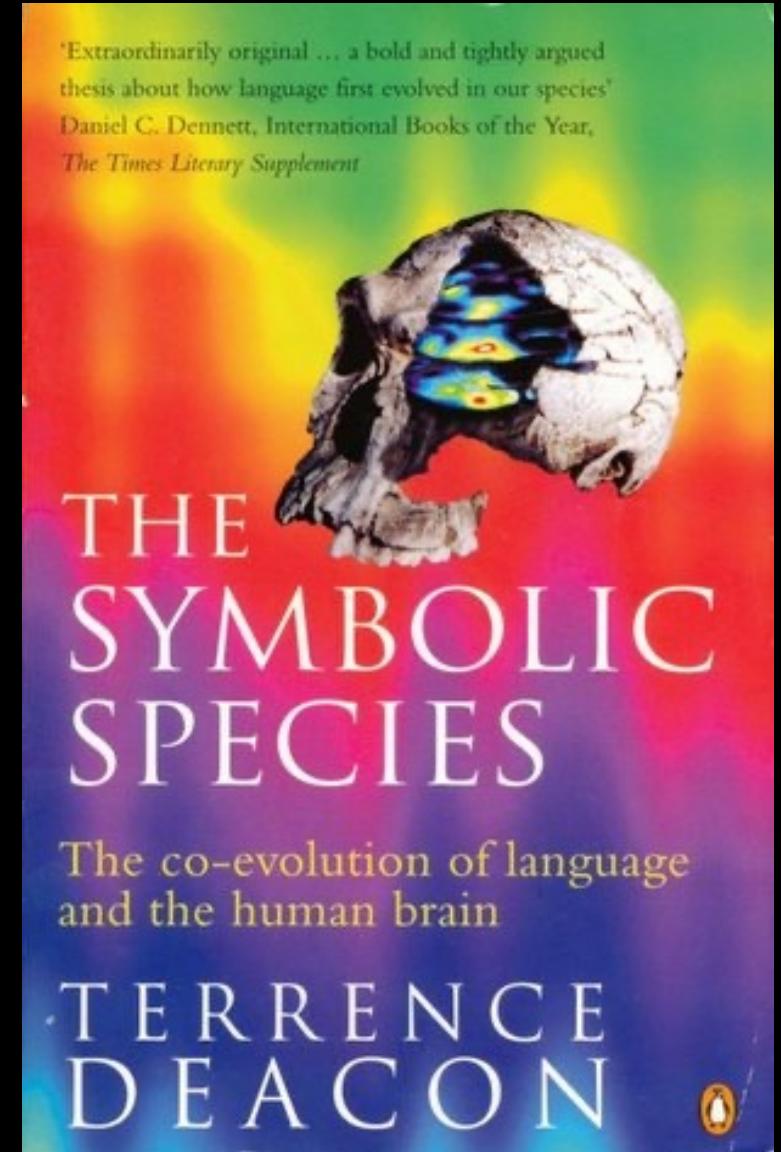
How much language can a chimp learn?

- Physiological constraints:
 - Humans have a different structure of the vocal chords (larynx) which enables us to control and produce very distinguished speech sounds
- Cognitive constraints:
 - What were the characteristics of Washoe and Nim Chimpsky's language abilities? (cf. Harley chapter)
 - What seems to be the most apparent limitations?
- Methodological issues
 - Confounding factors that, potentially, disqualify positive results?
 - Confounding factors that, potentially, disqualify negative results?



Do animals use symbols?

- Pavlovian conditioning
 - Ivan Pavlov (1849 - 1936), physiologist, studied salivation in dogs
 - Would ring a bell as food was served for the dog
 - Discovered that – after a while – the sound of the bell made the dogs salivate even in absence of food
 - The bell thus came to signify food?
- The connection between the bell sound and the food is arbitrary
- But is it a symbol in the mind of the dog?



Susan Savage-Rumbaugh – TED talk



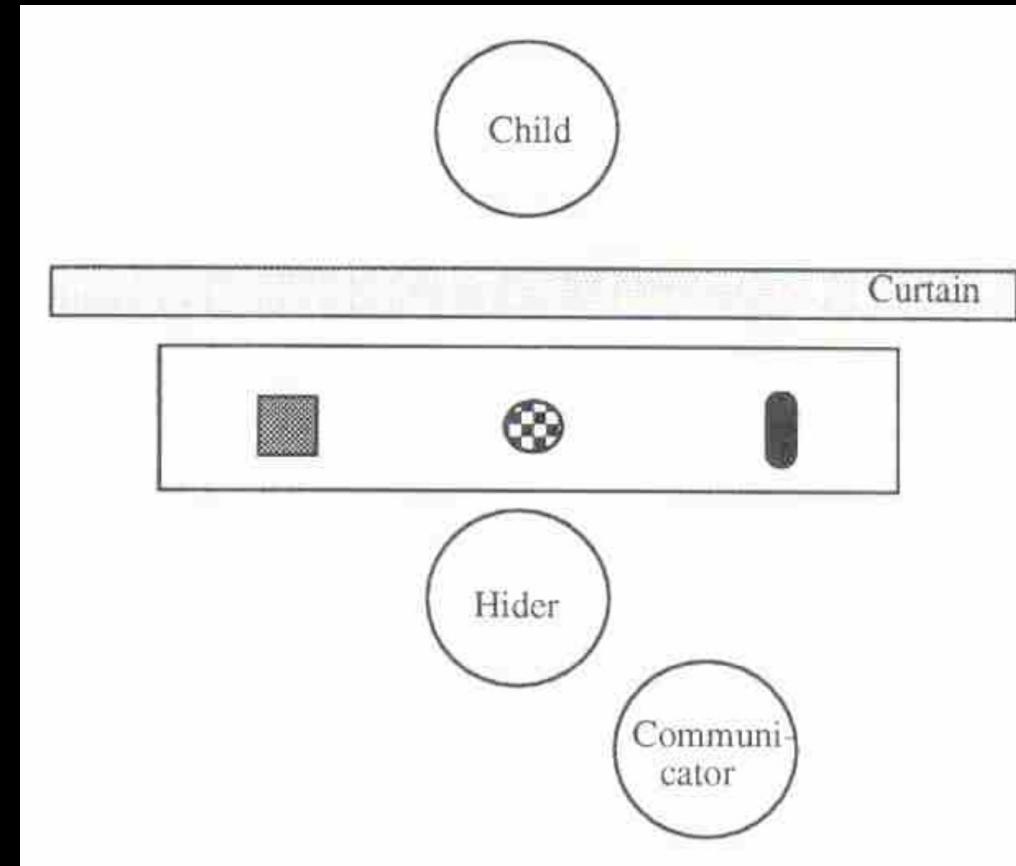
Kanzi – the bonobo

- Learned language by observation and apparently own motivation to communicate
- Seems to comprehend syntax

Class room experiment – find the candy!

Tomasello et al (1997). The comprehension of novel communicative signs by apes and human children

- Compared apes and human children in three conditions:
 - Pointing, marker and replica
- Experimental setup:
- Children got toys
- Apes got food





Results



- Both groups of children (aged 30 and 36 month) performed above chance in all tests (although they faired close to chance in the replica condition)
- The apes performed above chance only in the marker condition (six of the nine apes were pre-trained in the marker condition and one was trained in pointing)
- The three apes with no former training in marker performed below chance
- Tomasello and colleagues conclude: “Our hypothesis is that the apes did not understand the communicator’s communicative intentions at all (...)” (1997:1079)

...but

- Confounding factors in the experiment ???
- Apes do not expect altruistic help finding food (they compete for food) – the situation is very unnatural to them

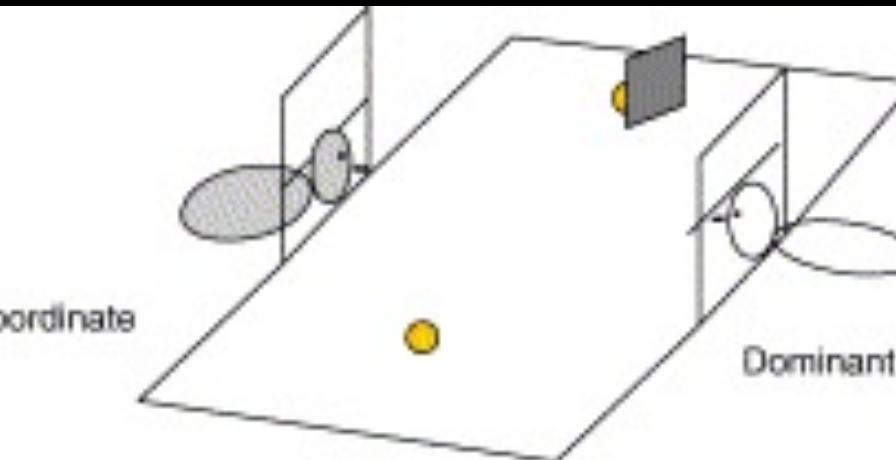
Trends in Cognitive Sciences

Volume 7, Issue 4, April 2003, Pages 153–156

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Chimpanzees understand psychological states – the question is which ones and to what extent

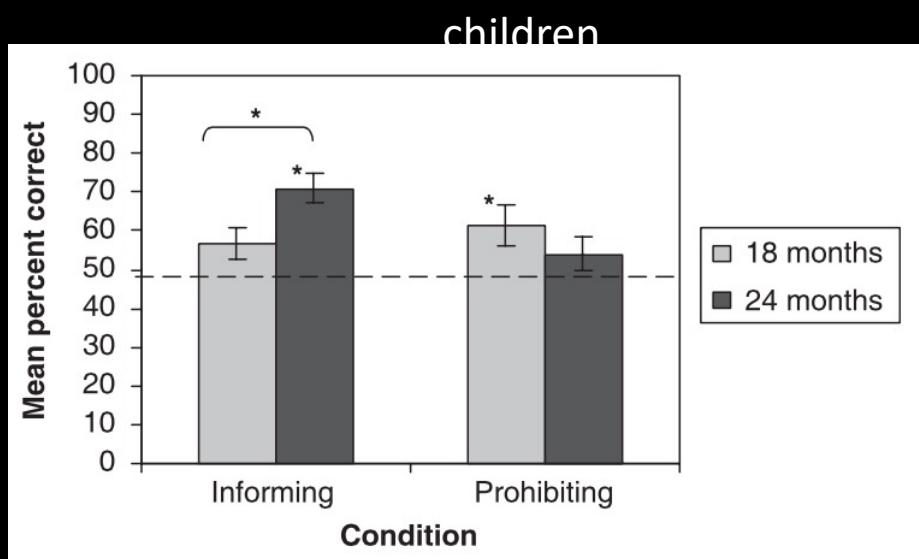
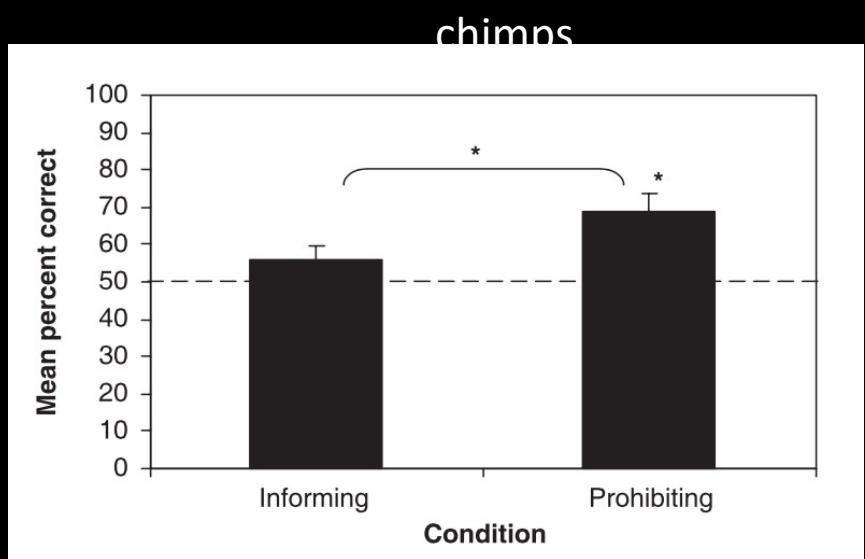
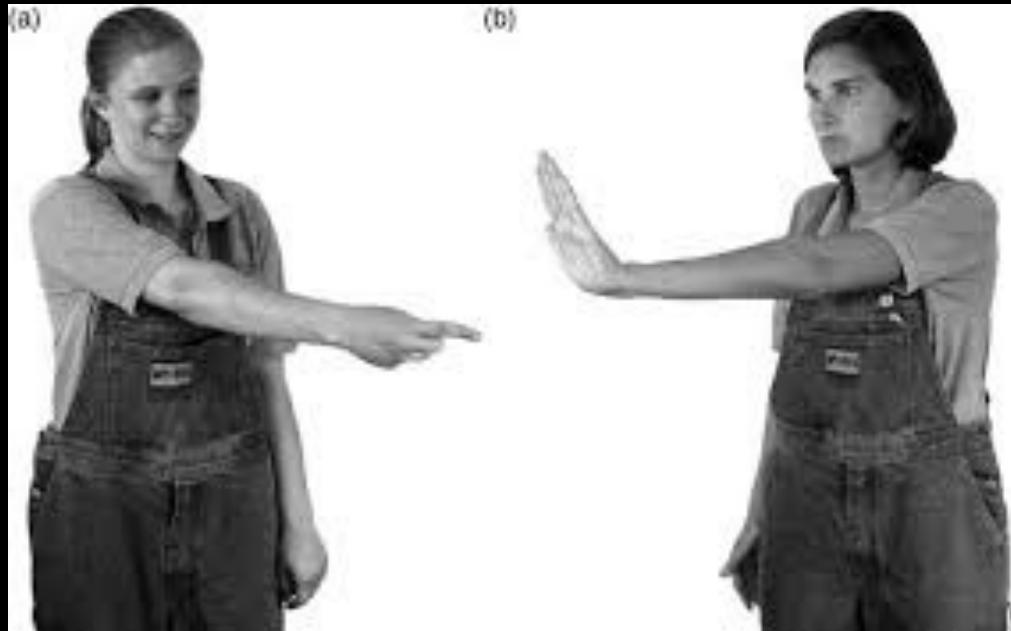
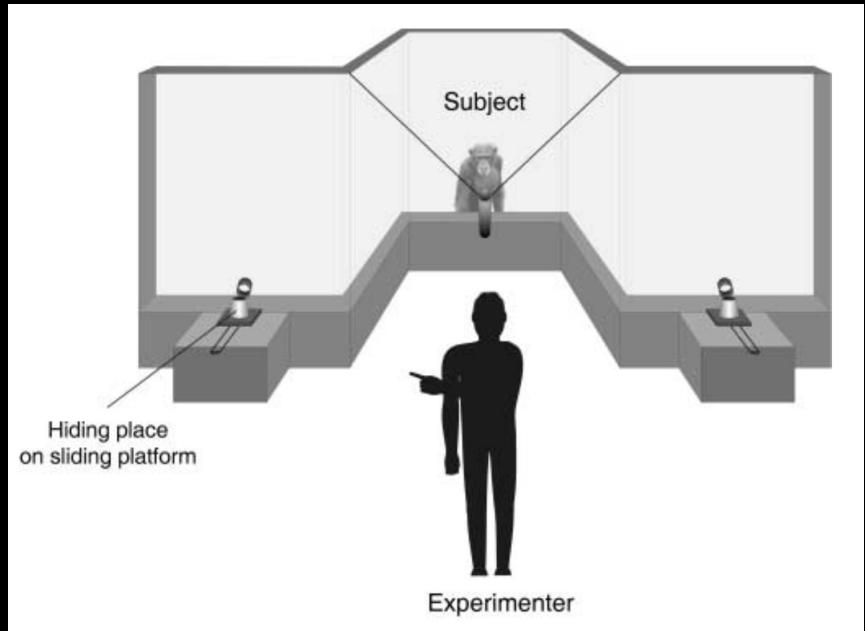
Michael Tomasello , Josep Call, Brian Hare



Subordinate

Dominant

TRENDS in Cognitive Sciences



Herrmann & Tomasello (2006). The understanding of cooperative and competitive motives

- Authors conclude:
 - “The current studies highlight the uniqueness of the way human beings communicate with one another. It is well known that, at least among primates, only humans engage in declarative communication in which the constitutive motive is either to share experience with someone or to inform them of something they need to know” (2006:526)
- The minimal difference: a natural motivation to cooperate and share information/knowledge?

Hare and Tomasello (2005). Human-like social skills in dogs?

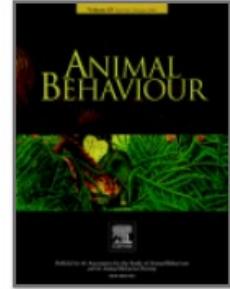


- Domestic dogs are unusually skilled at reading human social and communicative behavior – even more so than our nearest primate relatives.



Animal Behaviour

Volume 69, Issue 1, January 2005, Pages 11-18



Domestic goats, *Capra hircus*, follow gaze direction and use social cues in an object choice task

Juliane Kaminski , Julia Riedel, Josep Call, Michael Tomasello

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<https://doi.org/10.1016/j.anbehav.2004.05.008>

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The difference that makes a difference

- Special physiology (vocal chords/larynx)
- Domain specific theories:
 - An innate, genetically coded language module?
 - A hardwired ability to understand and use symbols?
 - How would that have come about in evolution?
- Domain general theories:
 - Language depends on general cognitive capacities (memory, attention, executive functions)
 - And special social capacities:
 - The ability to read intentions / mental states?
 - Or a species-unique motivation to collaborate?

Take home

- How is human language and animal communication different?
- Flexibility
 - Instinctive/reflexive: cognitive control
 - Vervet monkey alarm calls are produced also in captivity when there is no conspecific (recipient) around
- Intentionality on behalf of the recipient
 - Do recipient experience the sign as something different from its meaning (is the alarm call different from the predator)?
- Expressiveness
 - What can be communicated about?
 - Bees can only communicate about location of food
 - Vervet monkeys only have three alarm calls
- Imperatives versus declaratives
 - Many animals can communicate to request food or scare away competitors
 - Do animals communicate “declaratively” to share experiences and attention to items in their environment?