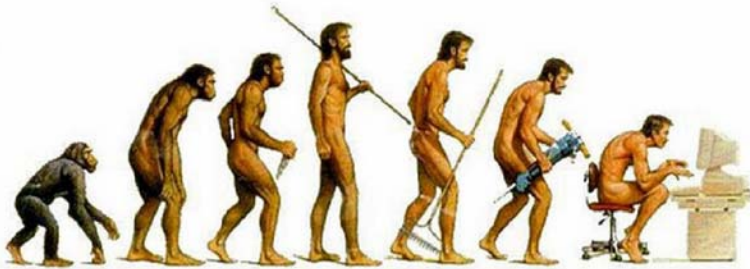
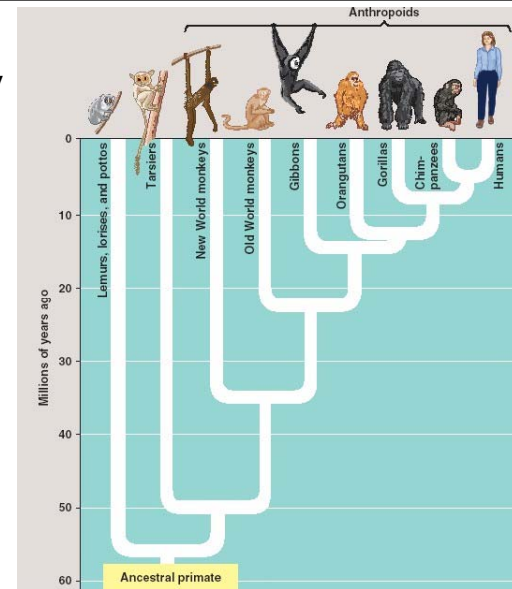


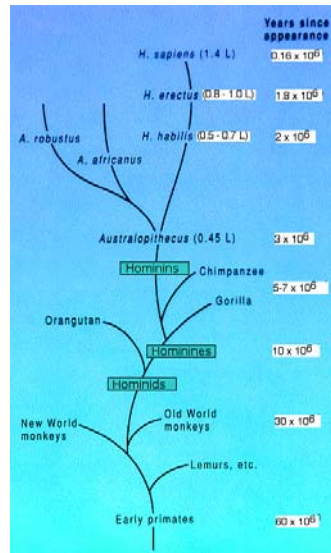
Herrmann, Call, Hernandez-Lloreda, Hare & Tomasello
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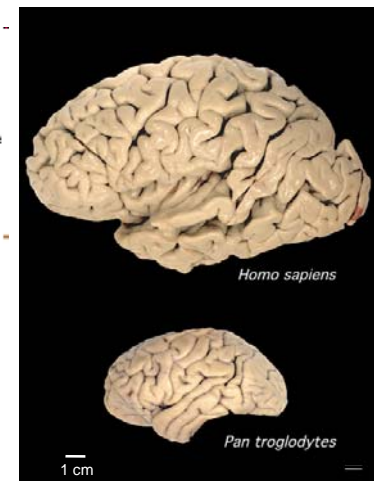
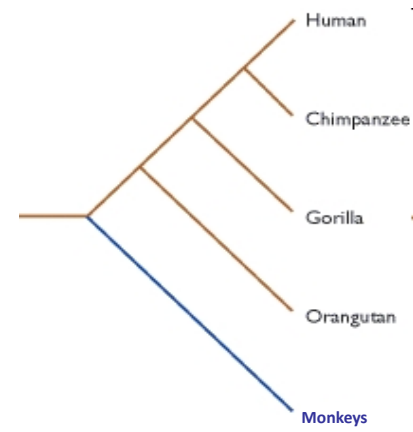
Primate Phylogeny

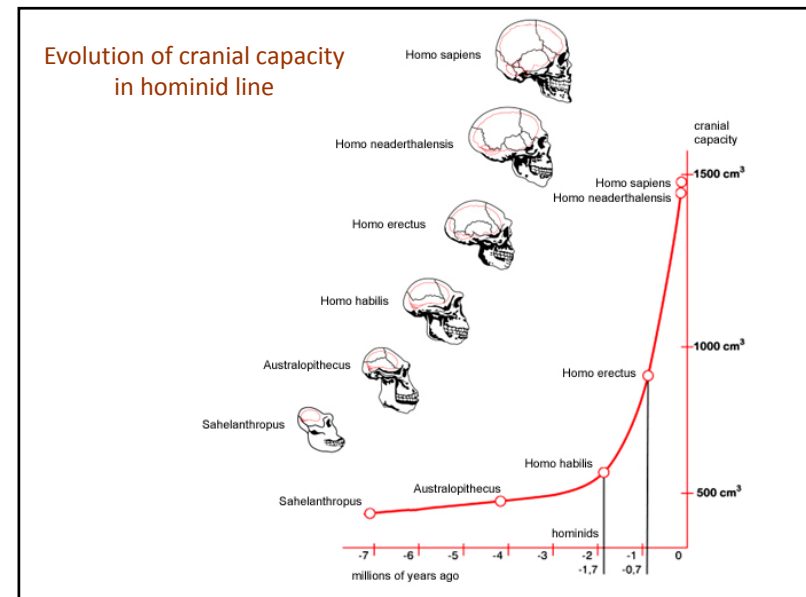
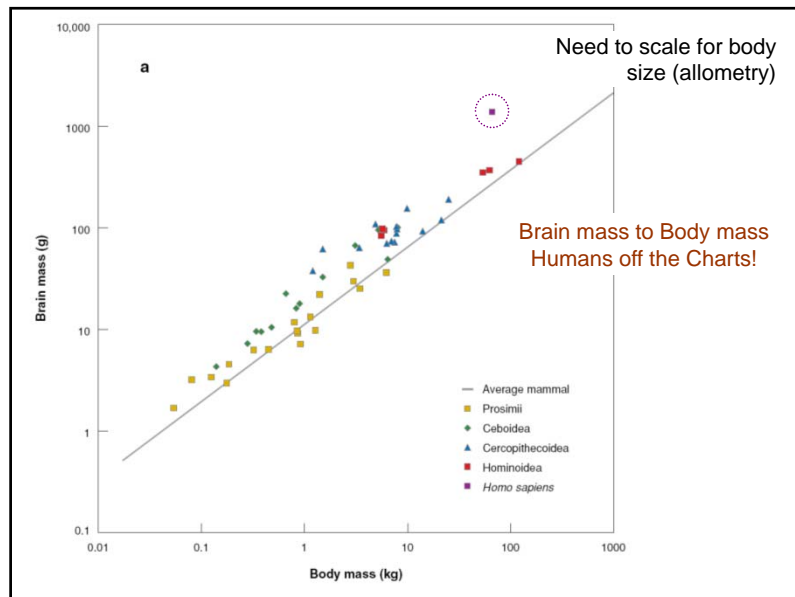
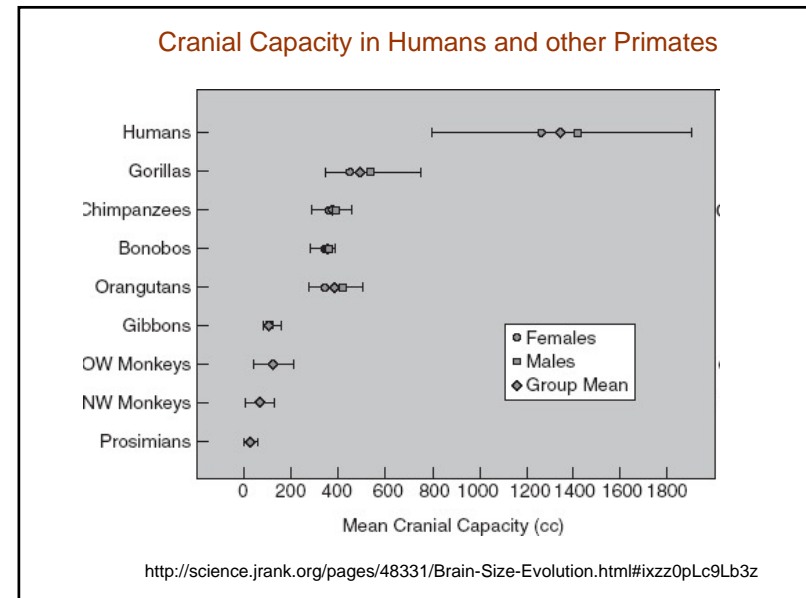
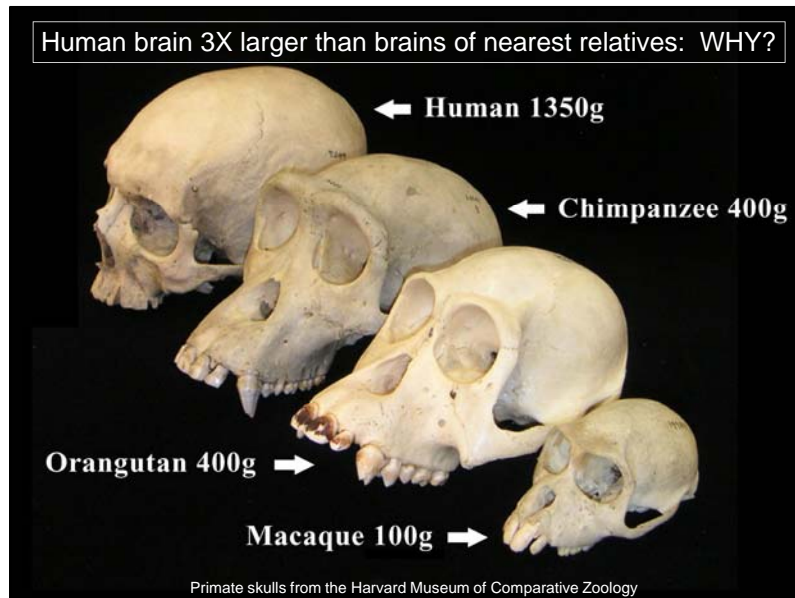


Hominid Phylogeny



Human brain 3X larger than brains
 of our nearest relatives: WHY?





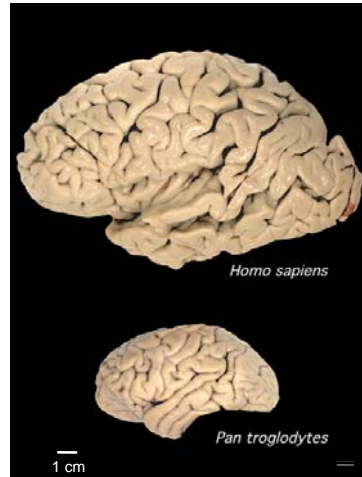
Herrmann, Call, Hernandez-Lloreda, Hare & Tomasello
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Large brain clearly supports cognitive skills not found in other primates, e.g., language.

Evolutionary question: given the enormous energetic expense of a large brain, why and how did humans evolve such powerful and distinctive cognitive abilities requiring so much neural tissue?

Social Brain theory (Dunbar):

Intellectual capacity shaped by complexities of social life, transfers to all other tasks = **general intelligence**



Herrmann, Call, Hernandez-Lloreda, Hare & Tomasello
 “Humans have evolved specialized skills of social cognition:
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☞ *The Cultural Intelligence Hypothesis*

We are not just social, but **ultra-social**: we have gone beyond the sophisticated primate social-cognitive skills for competing and cooperating with conspecifics, to evolve skills that enable us to actually create different cultural groups, each with its distinctive set of artifacts, symbols and social practices and institutions.

Human children learn to use these artifacts and tools and to participate in these practices, which require some **special social-cognitive** skills of **social learning**, **communication** and “theory of mind”.

Some other ape species transmit some behaviors socially or culturally, but their species-typical cognition does not depend on *participating in cultural interactions* in the same way as it does in humans.

Herrmann, Call, Hernandez-Lloreda, Hare & Tomasello
 “Humans have evolved specialized skills of social cognition:
 The Cultural intelligence Hypothesis” *Science* 2007

☞ *The Cultural Intelligence Hypothesis*

Humans must:

- Learn their native language in social interactions with others
- Acquire necessary subsistence skills by participating with experts in established cultural practices and
- (in many cultures) acquire skills with written language and mathematical symbols through formal schooling

In the end, human adults will have all kinds of cognitive skills not possessed by other primates, **but this outcome will be due largely to children's early emerging, specialized skills for absorbing the accumulated skillful practice and knowledge of their social group**

Herrmann, Call, Hernandez-Lloreda, Hare & Tomasello
 “Humans have evolved specialized skills of social cognition:
 The Cultural intelligence Hypothesis” *Science* 2007

In this study, the investigators sought to identify the distinctive features of human cognition that exist at an early stage of ontogeny, in order to directly compare the **cultural intelligence** and **general intelligence** hypotheses.

They gave a battery of tests (16 total) to chimps, orangutans and human children (age 2.5 years).

Two types of test: tasks relating to **physical cognition** (inanimate objects and their spatial-temporal causal relations) or tasks involving **social cognition** (animate beings and their intentional actions, perceptions and knowledge)

All subjects were naïve to the tests. The apes were living in semi-natural environments, i.e., had had a relatively species-typical upbringing.

Cultural intelligence hypothesis predicts that there should be an age in early human ontogeny (before children have been seriously influenced by written language, symbolic math and formal education) at which human's skills of physical cognition concerning things such as space, quantities, and causality are very similar to those of our nearest primate relatives but at which their skills of **social-cultural cognition** (specifically those most directly involved in cultural creation and learning, such as **social learning, communication, and Theory of Mind**) are already distinctively human. **General intelligence hypothesis** predicts **no** such differences.



human



chimpanzee



orangutan

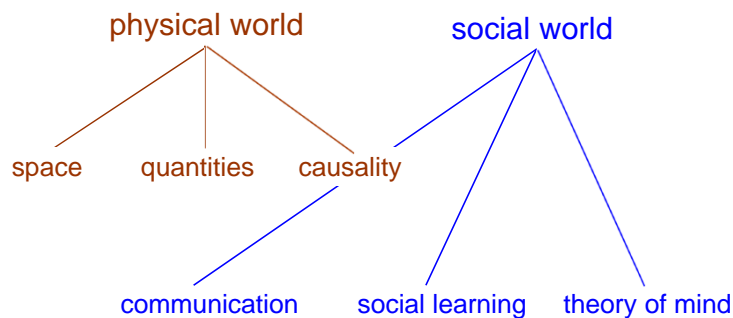
Rationale for The Tests

Primate cognition of the **physical world** evolved mainly in the context of foraging. To locate food, primates need cognitive skills for dealing with **space**; to choose wisely among multiple food sources, they need cognitive skills for dealing with **quantities**; and for extracting food from difficult places, they need cognitive skills for understanding **causality**.

Primate cognition of the **social world** evolved because of the tension between cooperation and competition among group members: To act cooperatively or to manipulate the behavior of others, primates need skills of **communication**; to learn things vicariously from observing others, they need skills of **social learning**; and to predict the behavior of others in competition, they need cognitive skills for understanding psychological states such as goals and perceptions (**theory of mind**).

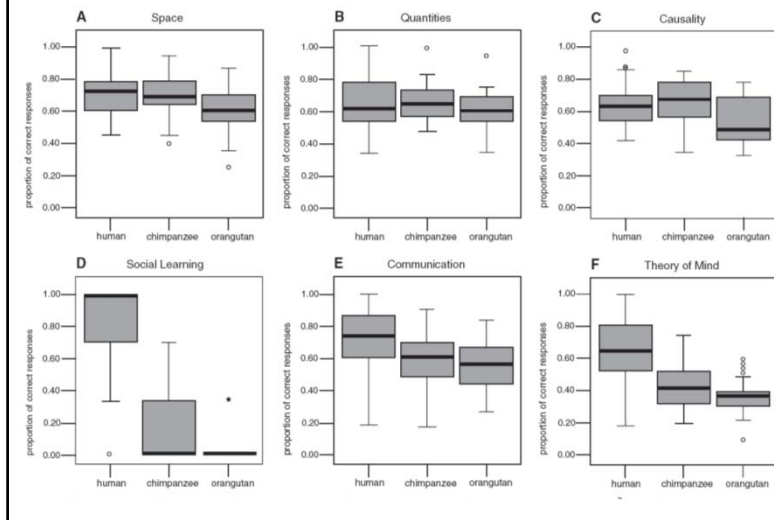
Test battery: 2 domains of physical cognition and social cognition, with 3 cognitive scales for each (***the six items italicized above***).

The Test Battery

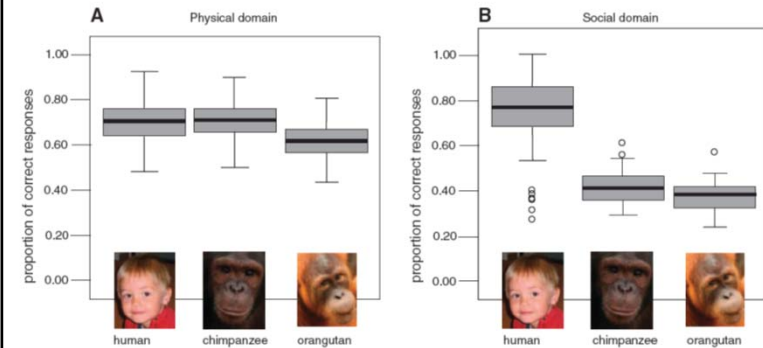


Scale	Task	Description
Space	Spatial memory (1 item, 3 trials)	Locating a reward.
	Object permanence (3 items 9 trials)	Tracking of a reward after invisible displacement.
	Rotation (3 items, 9 trials)	Tracking of a reward after a rotation manipulation.
	Transposition (3 items, 9 trials)	Tracking of a reward after location changes.
Quantity	Relative numbers (1 item, 13 trials)	Discriminating quantity.
	Addition numbers (1 item, 7 trials)	Discriminating quantity with added quantities.
Causality	Noise (2 items, 6 trials)	Causal understanding of produced noise by hidden rewards.
	Shape (2 items, 6 trials)	Causal understanding of appearance change by hidden reward
	Tool use (1 item, 1 trial)	Using a stick to retrieve a reward which is out of reach.
	Tool properties (5 items, 15 trials)	Understanding of functional and nonfunctional tool properties.
Social learning	Social learning (3 items, 3 trials)	Solving a simple but not obvious problem by observing a demonstrated solution.
Communication	Comprehension (3 items, 9 trials)	Understanding communicative cues indicating a reward's hidden location.
	Pointing cups (1 item, 4 trials)	Producing communicative gestures in order to retrieve a hidden reward.
	Attentional state (4 items, 4 trials)	Choosing communicative gestures considering the attentional state of the recipient.
Theory of Mind	Gaze following (3 items, 9 trials)	Following an actor's gaze direction to a target.
	Intentions (2 items, 6 trials)	Understanding what actor intended to do (unsuccessfully).

Results



Results

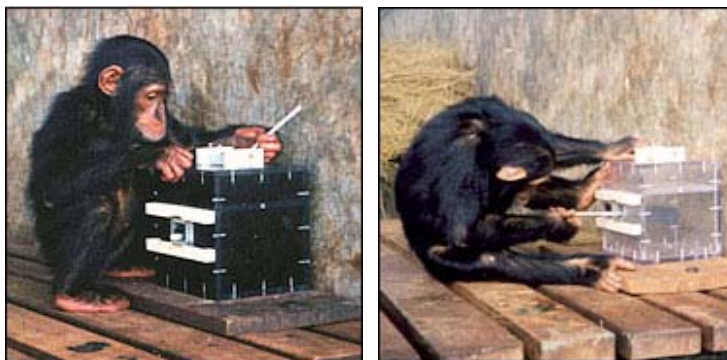


Conclusion:

Human children have **special social-cognitive** skills of **social learning**, **communication** and **"theory of mind"**. Cultural learning is possible in humans because of these special capabilities.

Victoria Horner · Andrew Whiten (2005)

Causal knowledge and imitation/emulation switching in chimpanzees (*Pan troglodytes*) and children (*Homo sapiens*). *Cognition* 8: 164-181.



http://www.youtube.com/watch?v=k_Fb513F85M

<http://www.youtube.com/watch?v=GlnzFRCAUEw>



But chimps are better than humans at some things

Perhaps at lots of things!



<http://www.youtube.com/watch?v=cPiDHXm0VA>

<http://www.livescience.com/27192-chimps-quickly-recall-numbers-video.html>