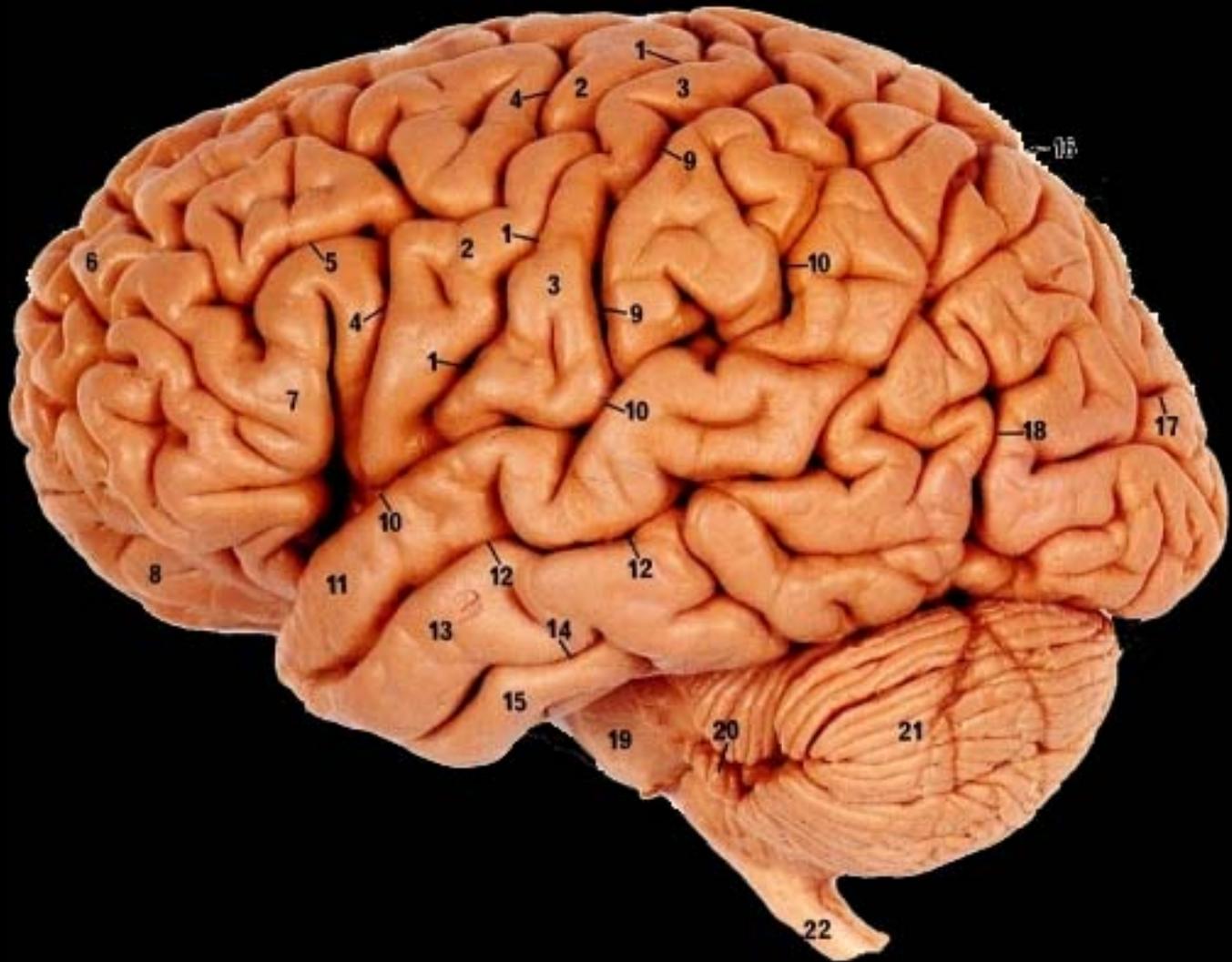
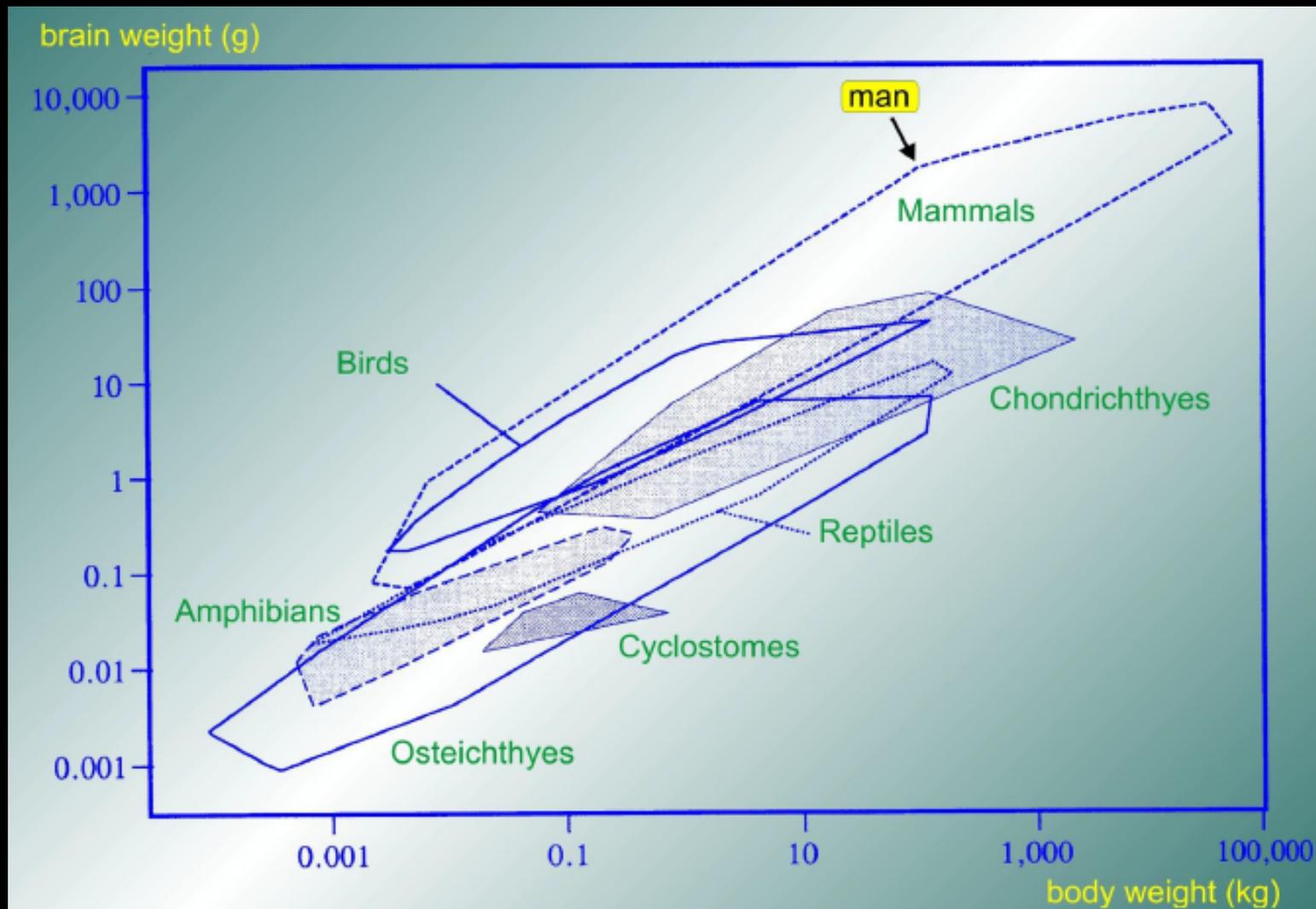


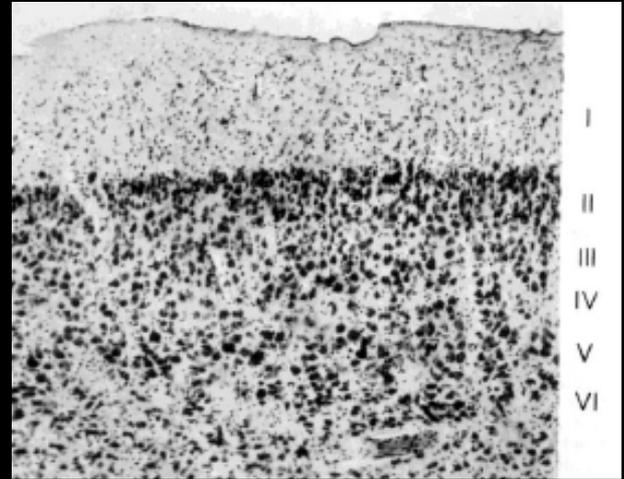
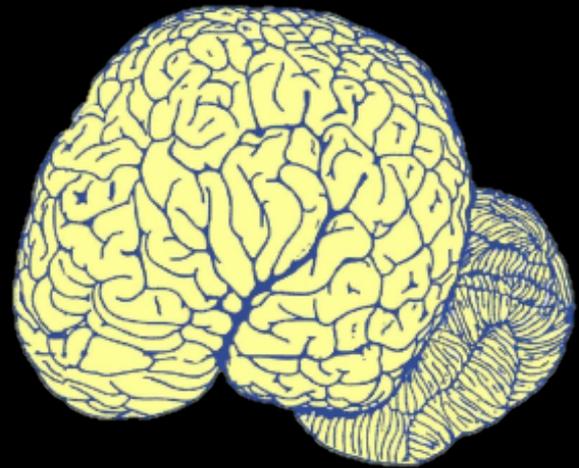
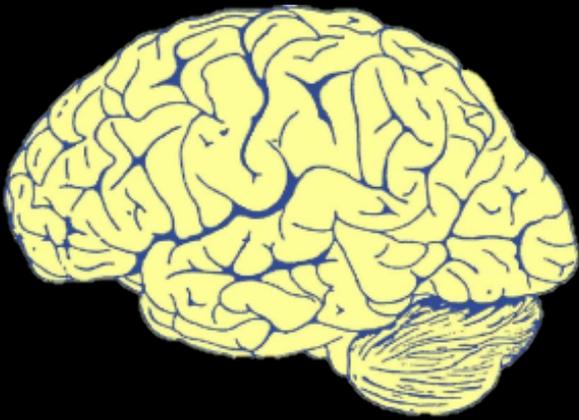
L'evoluzione del cervello ominide e comparsa del cervello sociale





Relazione fra la massa cerebrale e la massa corporea i diverse classi di vertebrati





Whale

Human

Evoluzione della corteccia cerebrale nelle scimmie e nei primati

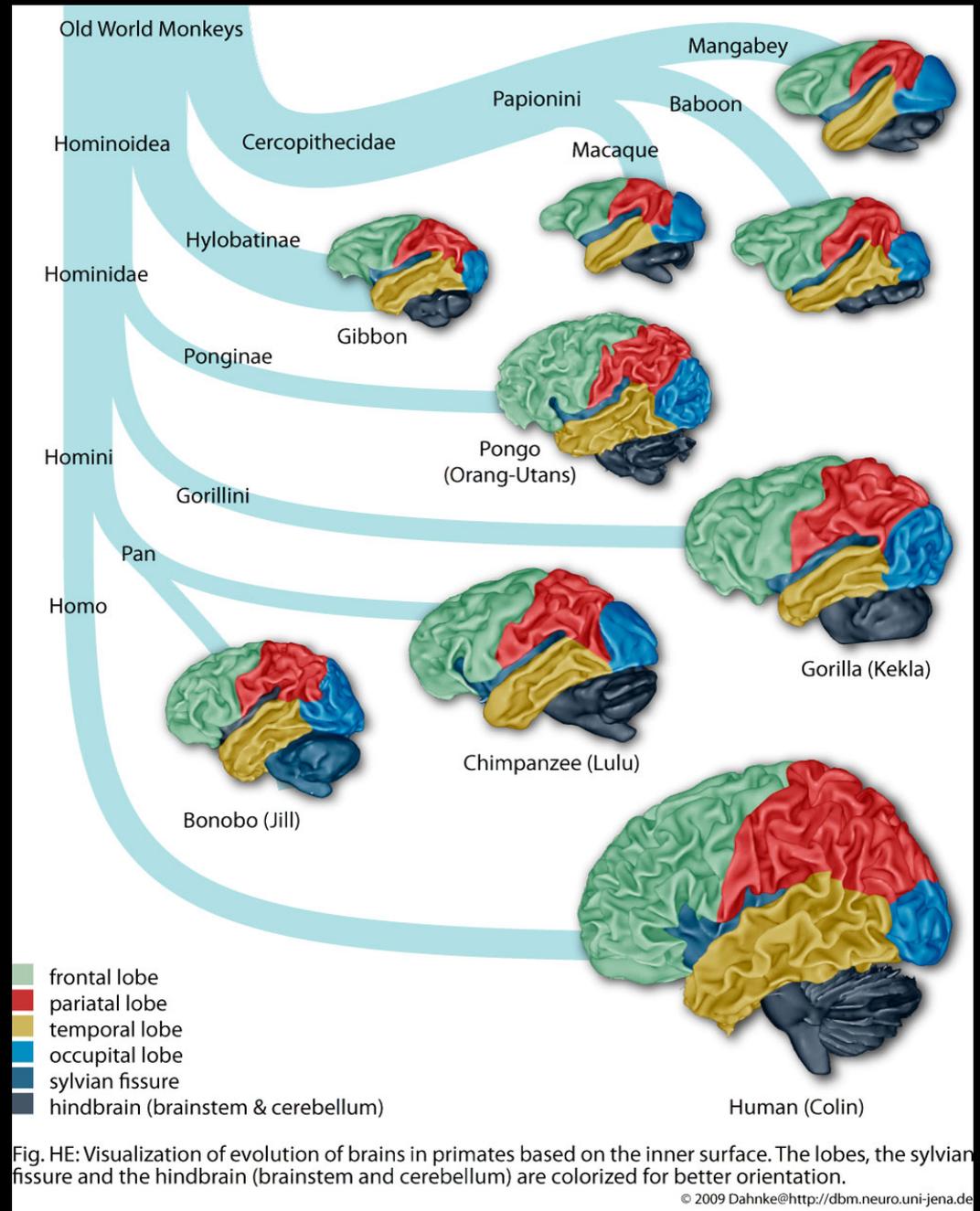
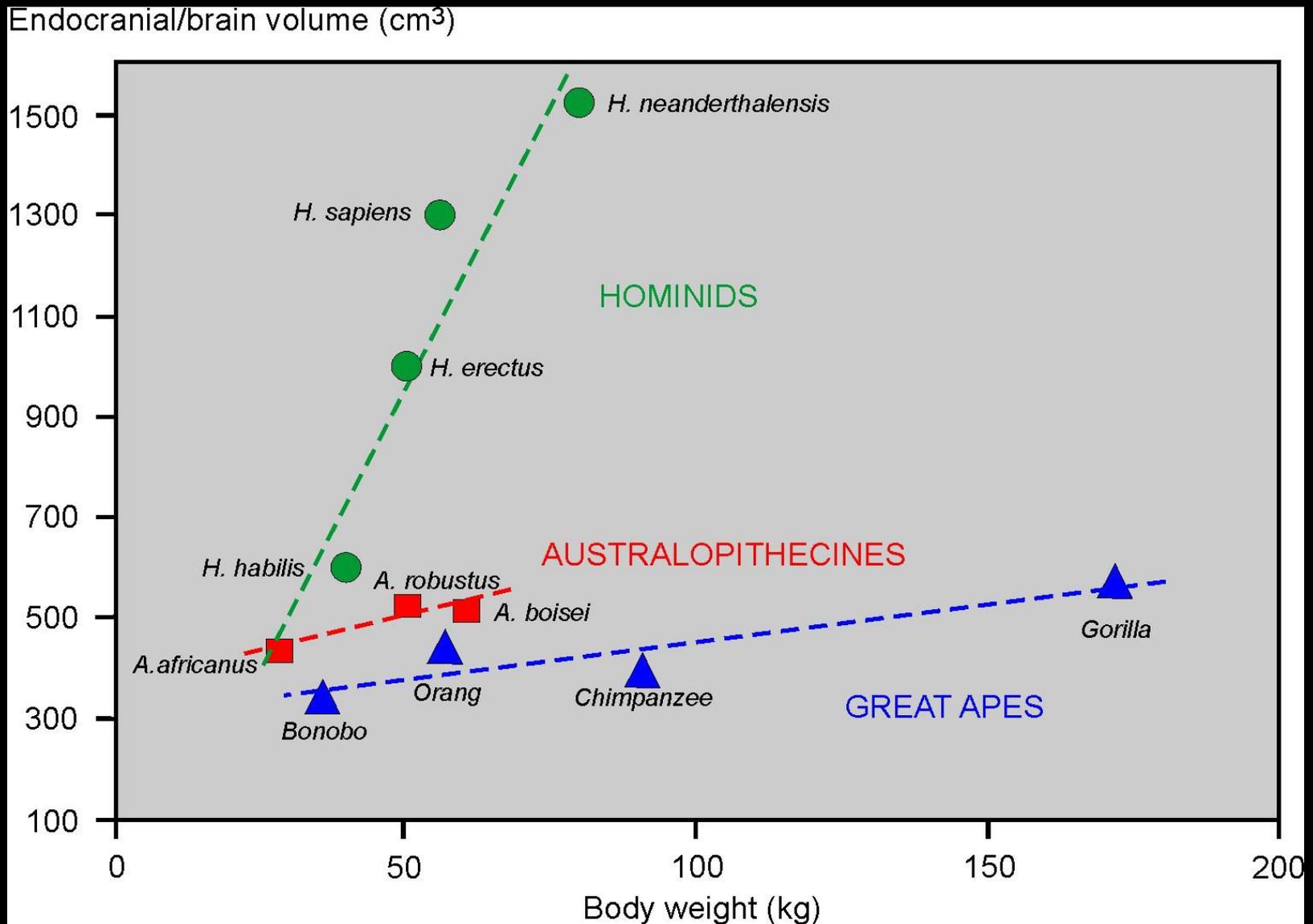


Fig. HE: Visualization of evolution of brains in primates based on the inner surface. The lobes, the sylvian fissure and the hindbrain (brainstem and cerebellum) are colorized for better orientation.



che cosa ha determinato l'espansione della corteccia cerebrale nella nostra evoluzione?

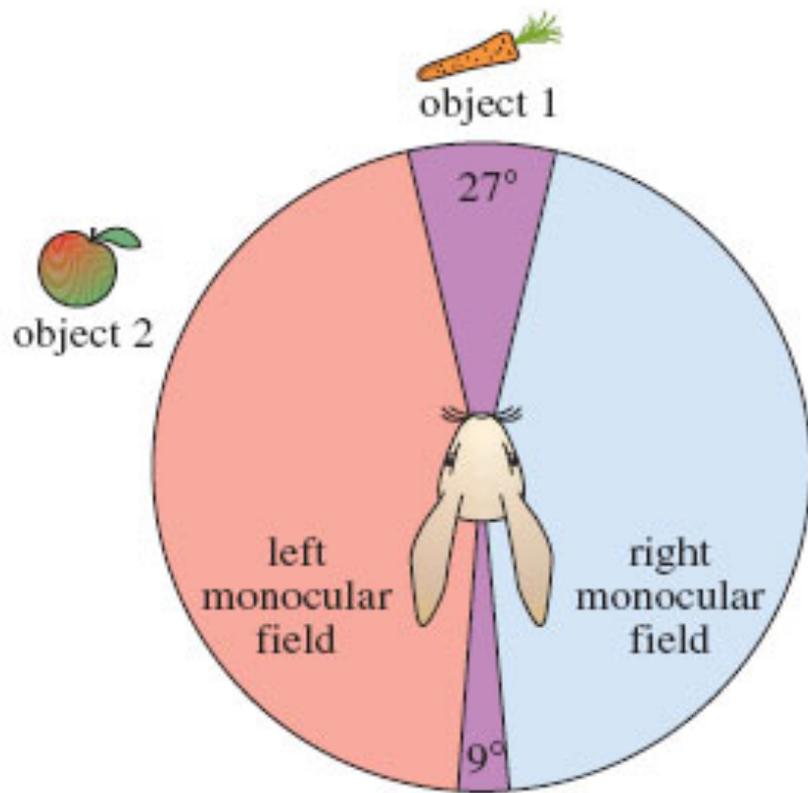


Rispetto agli altri primati, la nostra specie ha

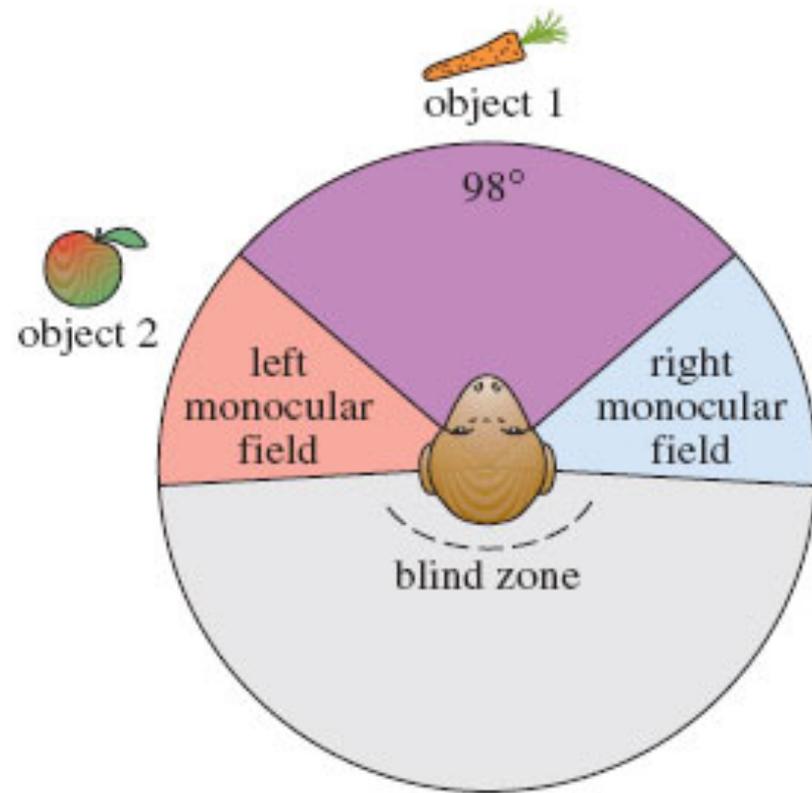
- **il cervello più grande (la neocorteccia più estesa)**
- **un periodo di sviluppo più prolungato**
- **Il cervello più immaturo alla nascita**

Che relazione c'è fra questi fatti?

Qual è la spinta evuzionistica che ha indotto l'espansione della corteccia cerebrale?



(a) rabbit



(b) monkey

Primati primitivi

Arboricoli nella foresta

Mangiano insetti, frutta

Movimento fine (reaching-grasping) guidato dalla visione:

involuzione del sistema olfattivo

sviluppo visione frontale (tridimensionale)

evoluzione del sistema visivo

pollice opponente

dita coperte da unghie



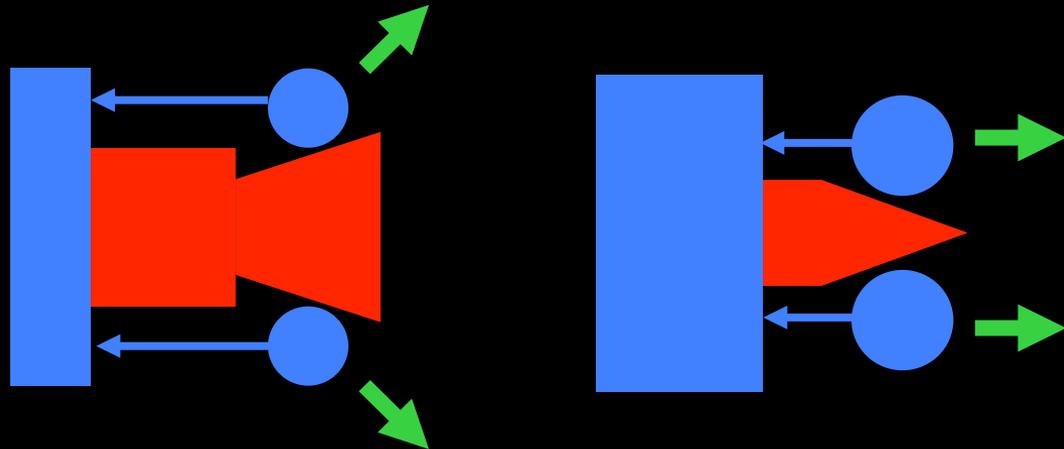
Inizialmente notturni, poi diurni (vita nella savana)

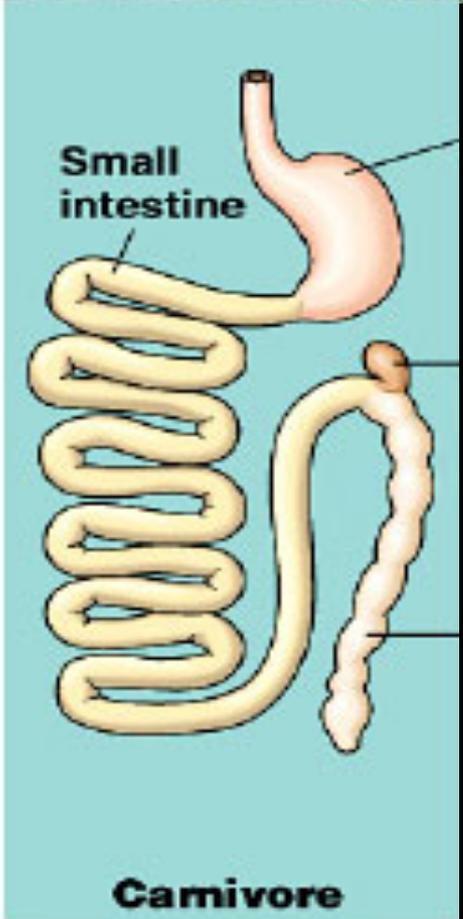
visione foveale, predominanza dei coni (acuità)

visione cromatica (dicromatica poi tricromatica) Vita diurna: sviluppo attività

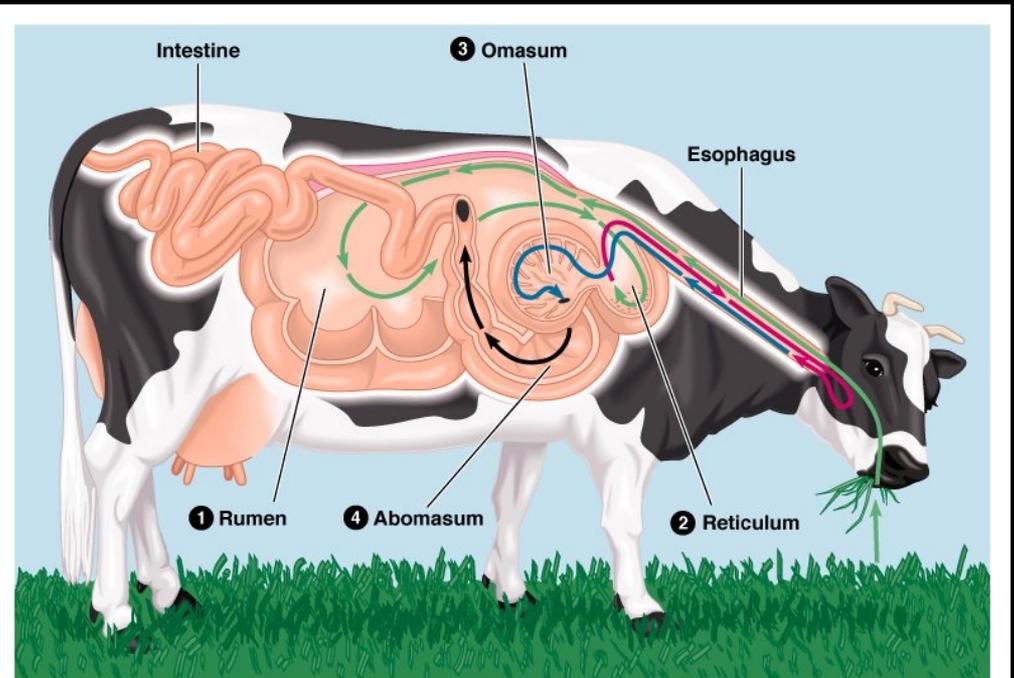
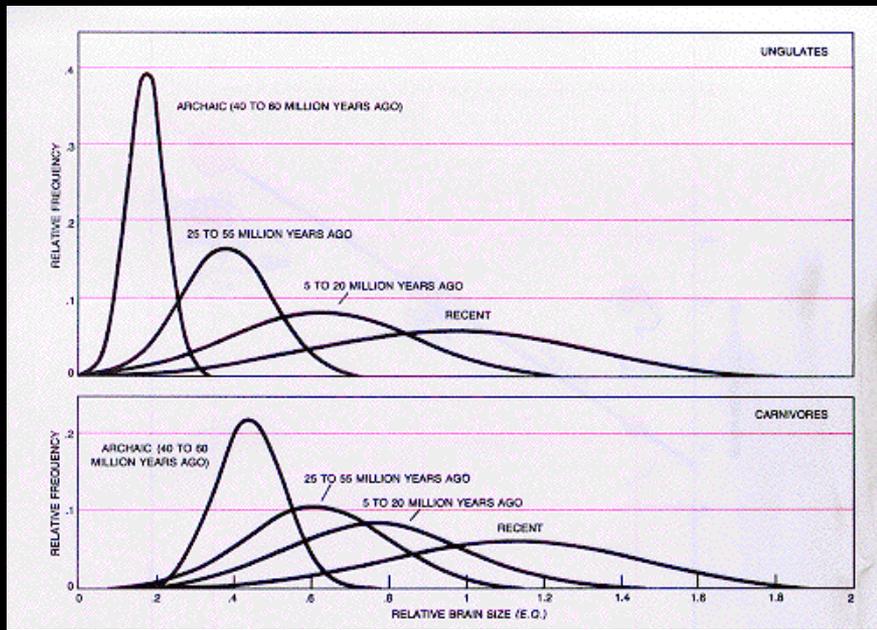
sociali (protezione, ricerca del cibo)

Sistema olfattivo
Sistema visivo

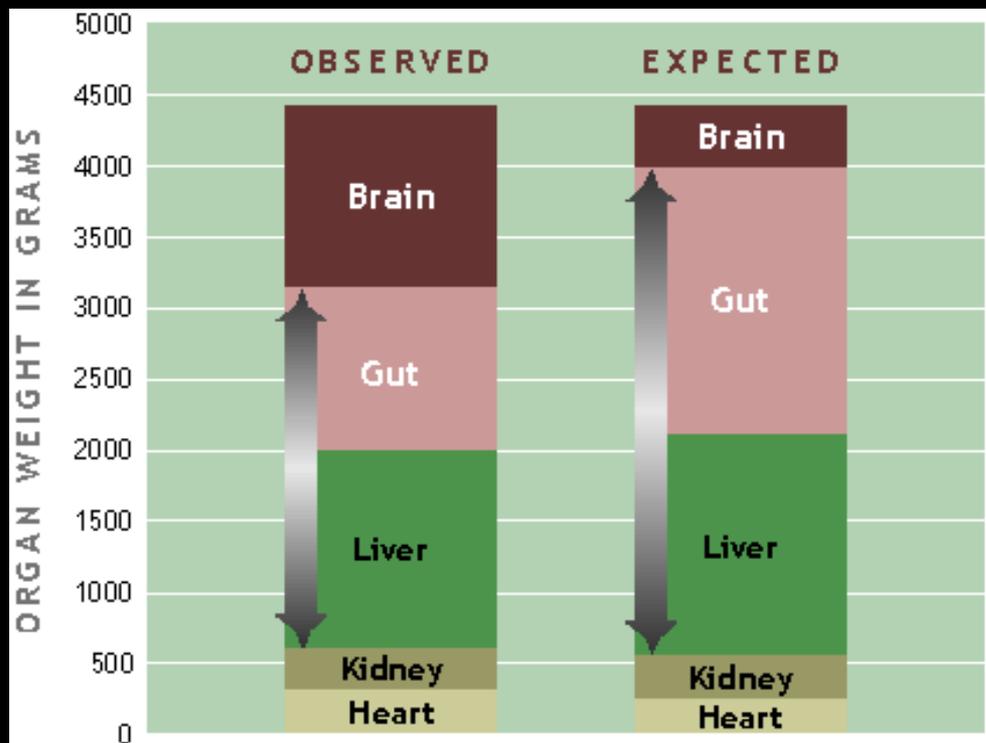




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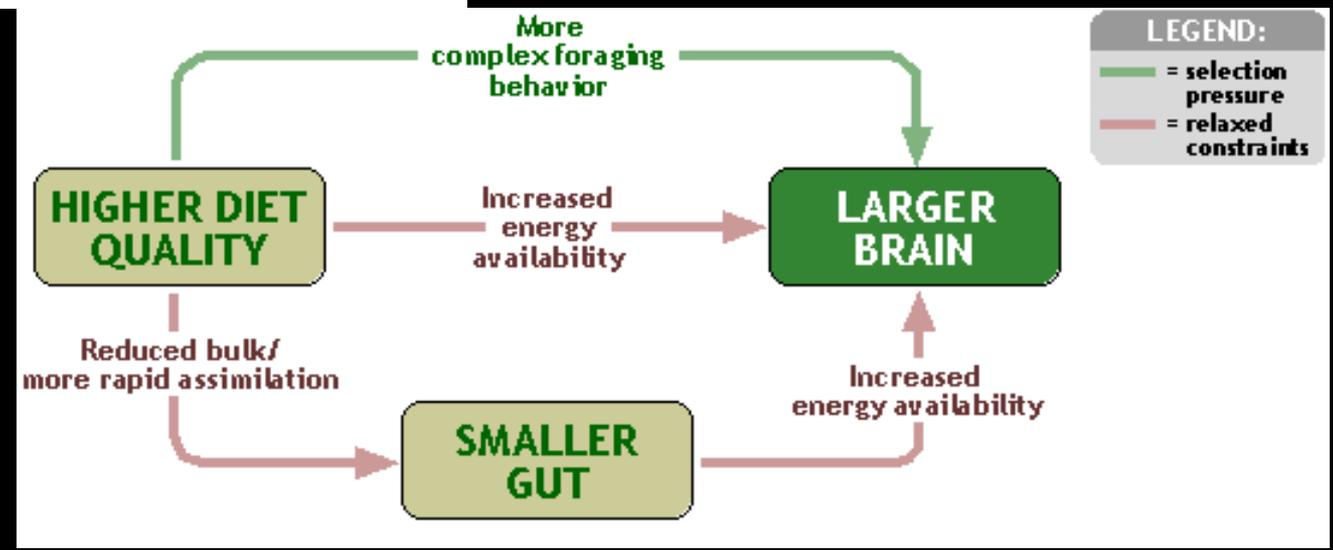


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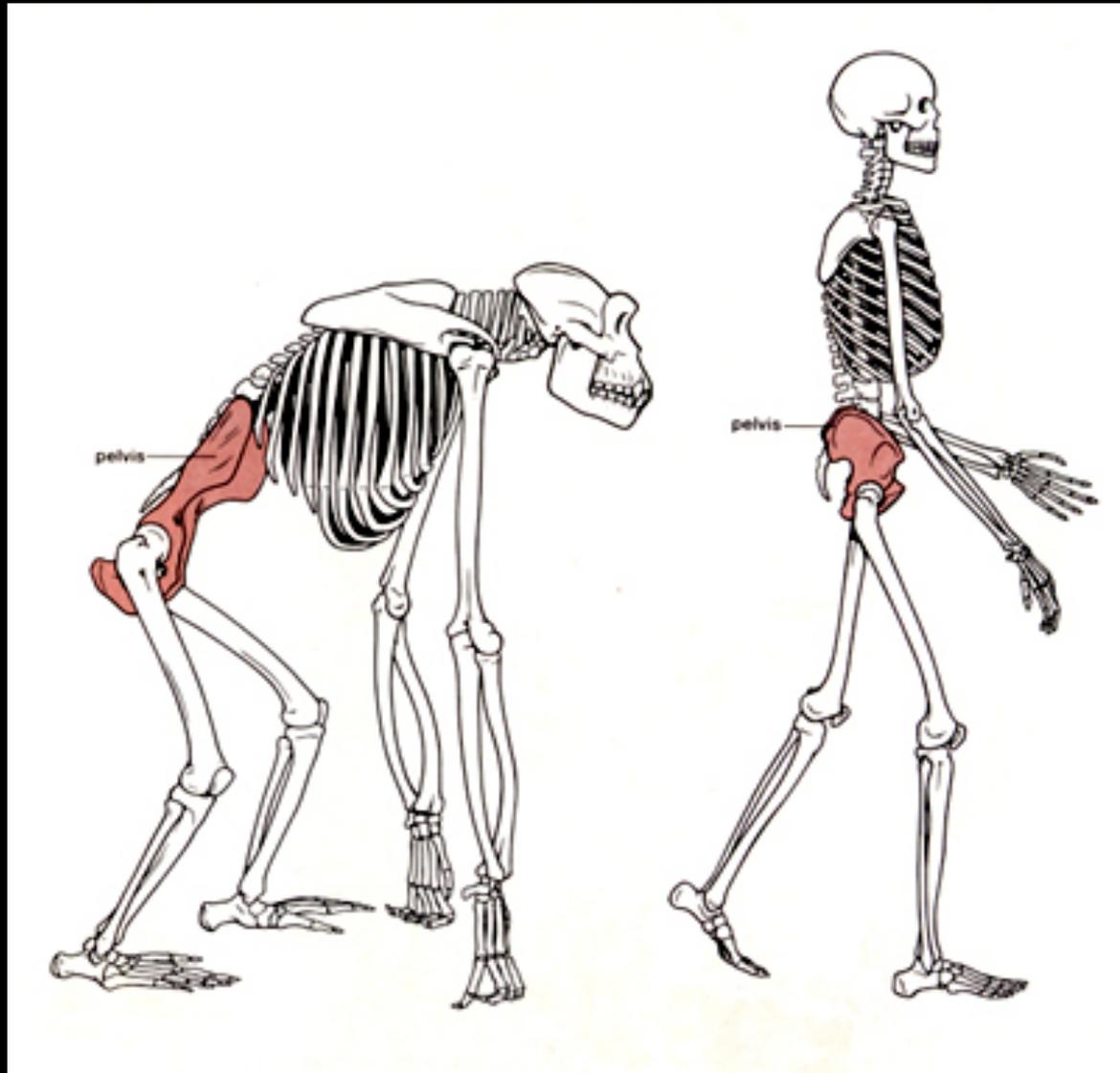


Observed and expected organ masses for a "standard" 65-kg human.

Una nuova dieta

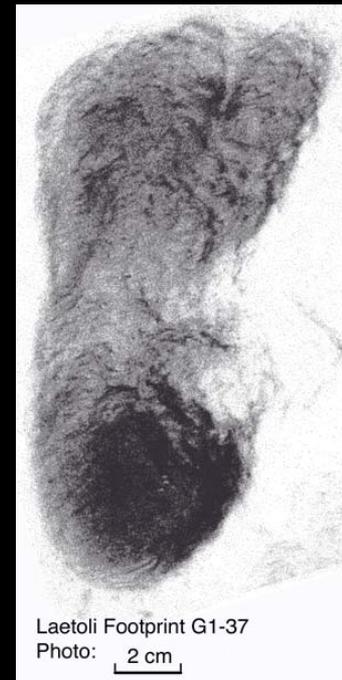
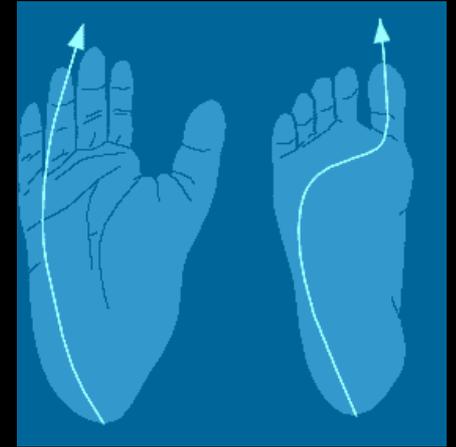


bipedismo

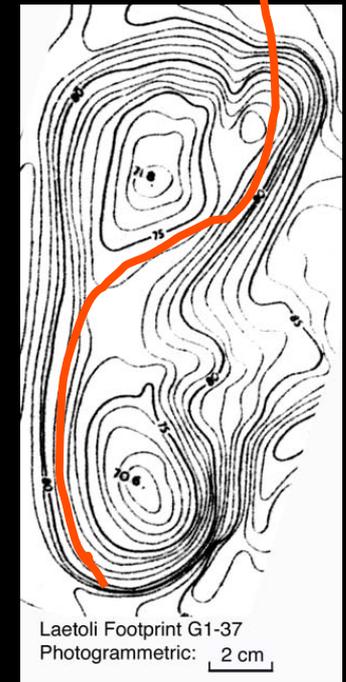


Il bipedismo ha senso solo se gli arti liberati dal compito di sostenere il corpo assumono una nuova funzione

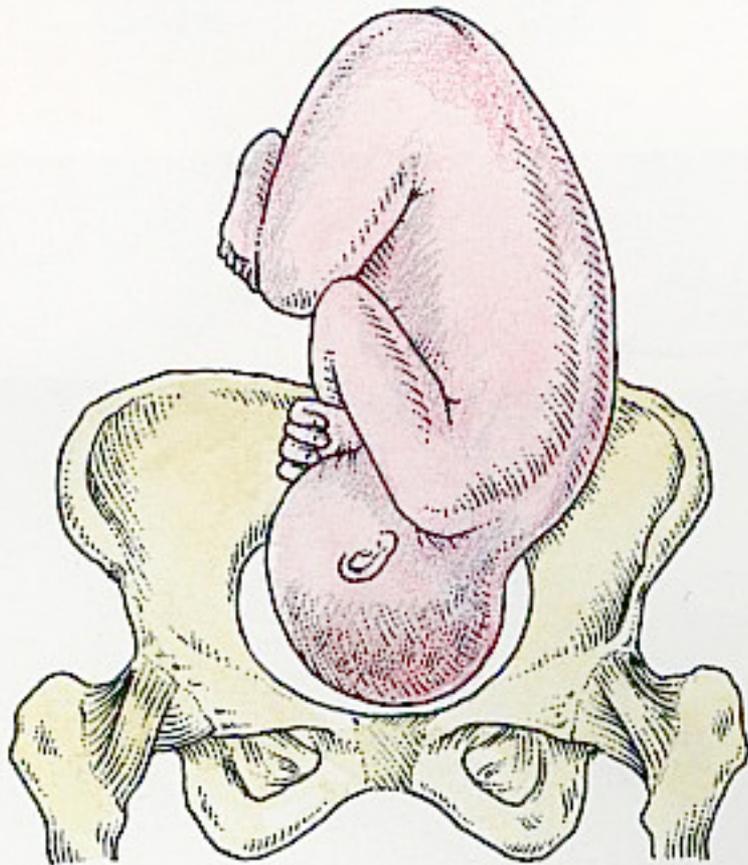
Laetoli footprints



Laetoli Footprint G1-37
Photo: 2 cm



Laetoli Footprint G1-37
Photogrammetric: 2 cm



Skull clearance
at birth

Brain size
at birth

Adult
brain size



128 cc

390 cc



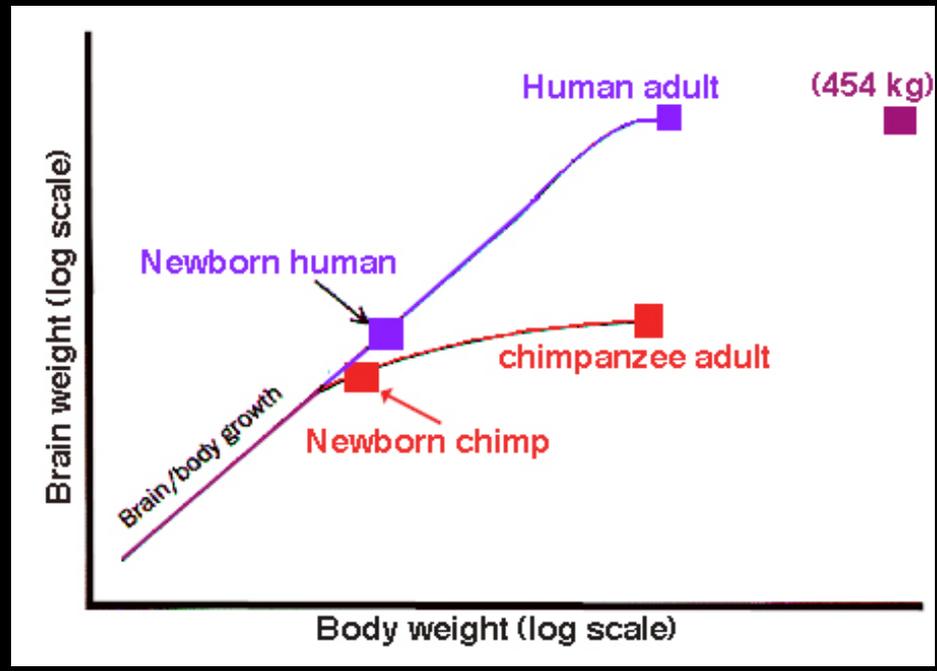
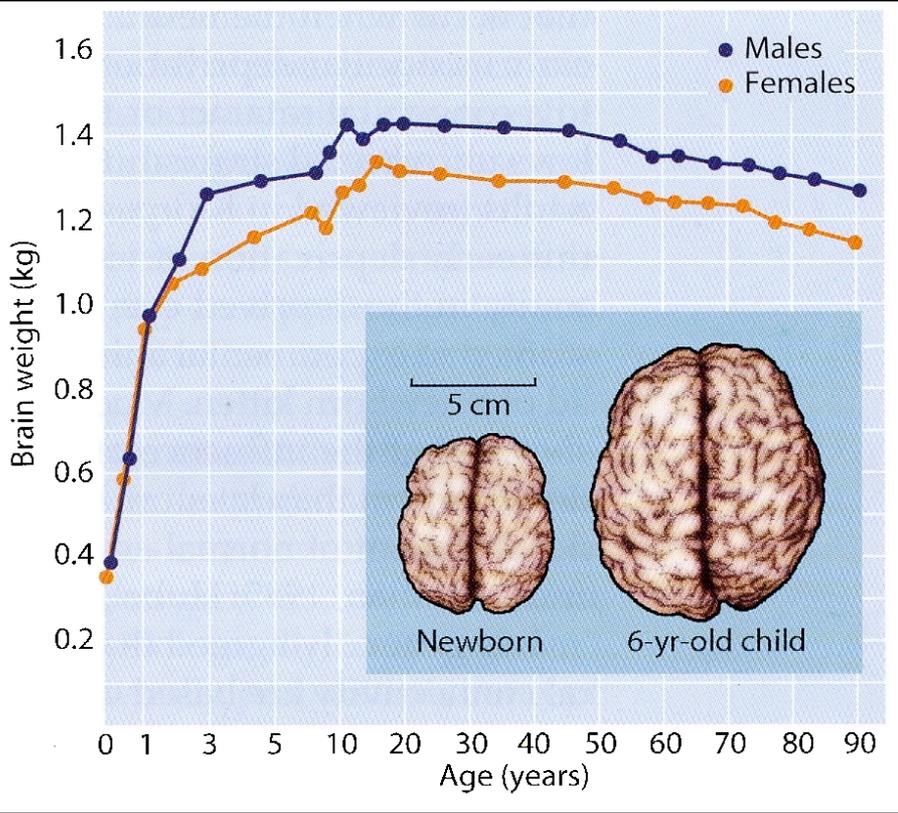
162 cc
(estimate)

415 cc



384 cc

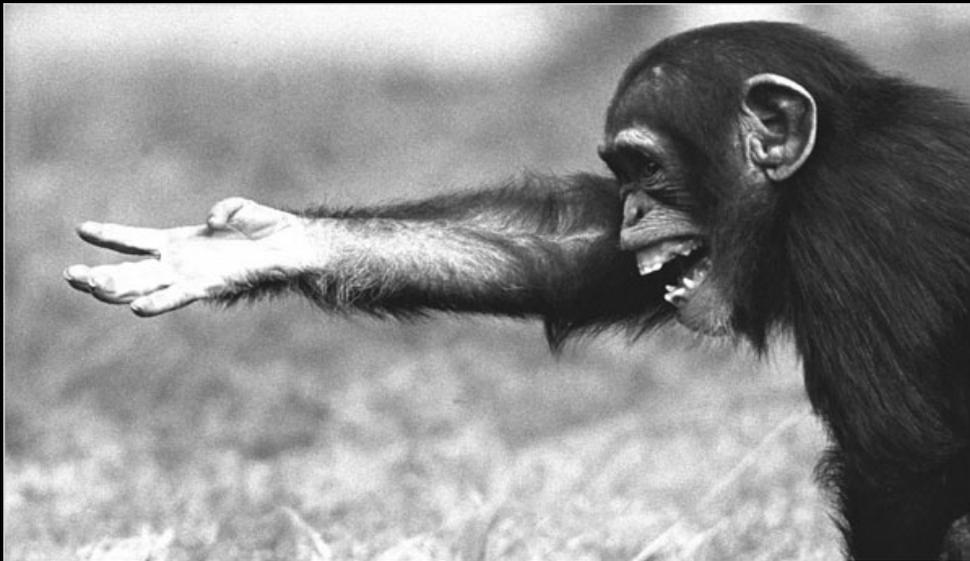
1,350 cc



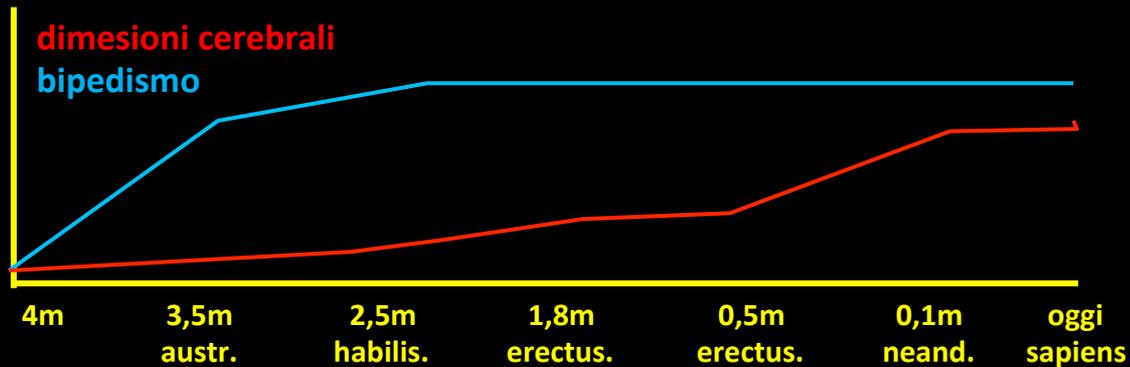
Il bipedismo lascia le mani libere

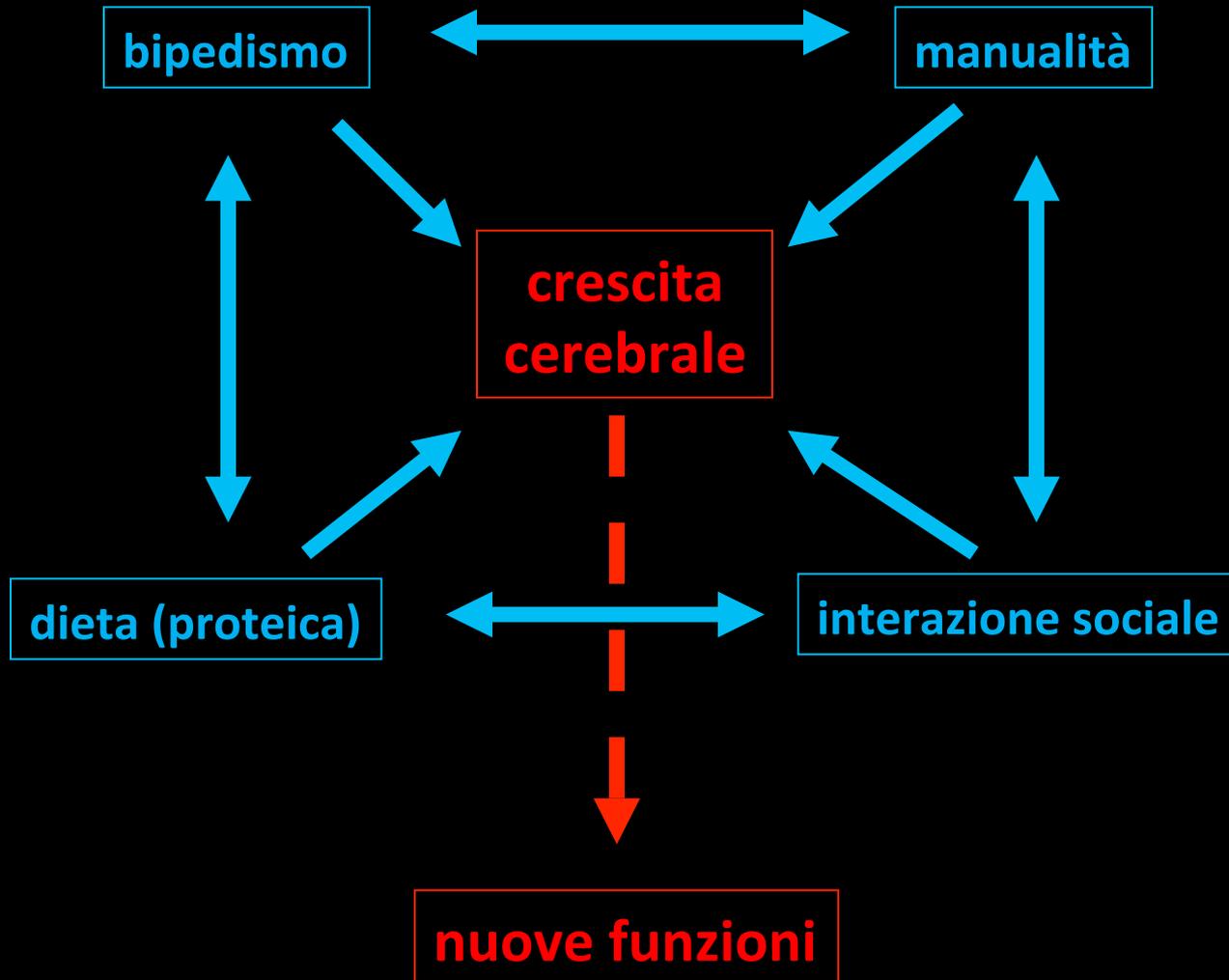
Le mani libere permettono

**La produzione di strumenti
La comunicazione gestuale**



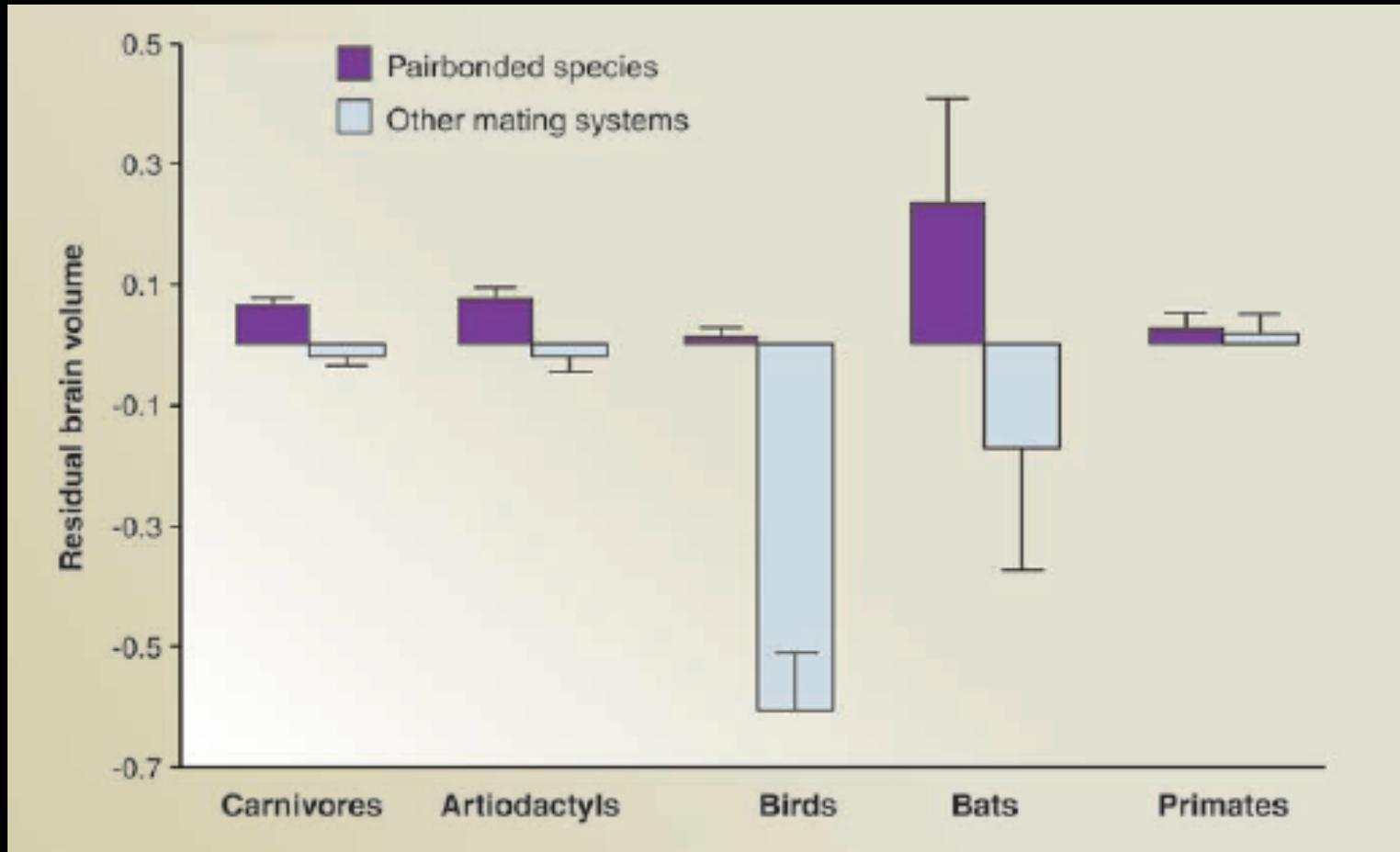
Comparison of Primate Hands



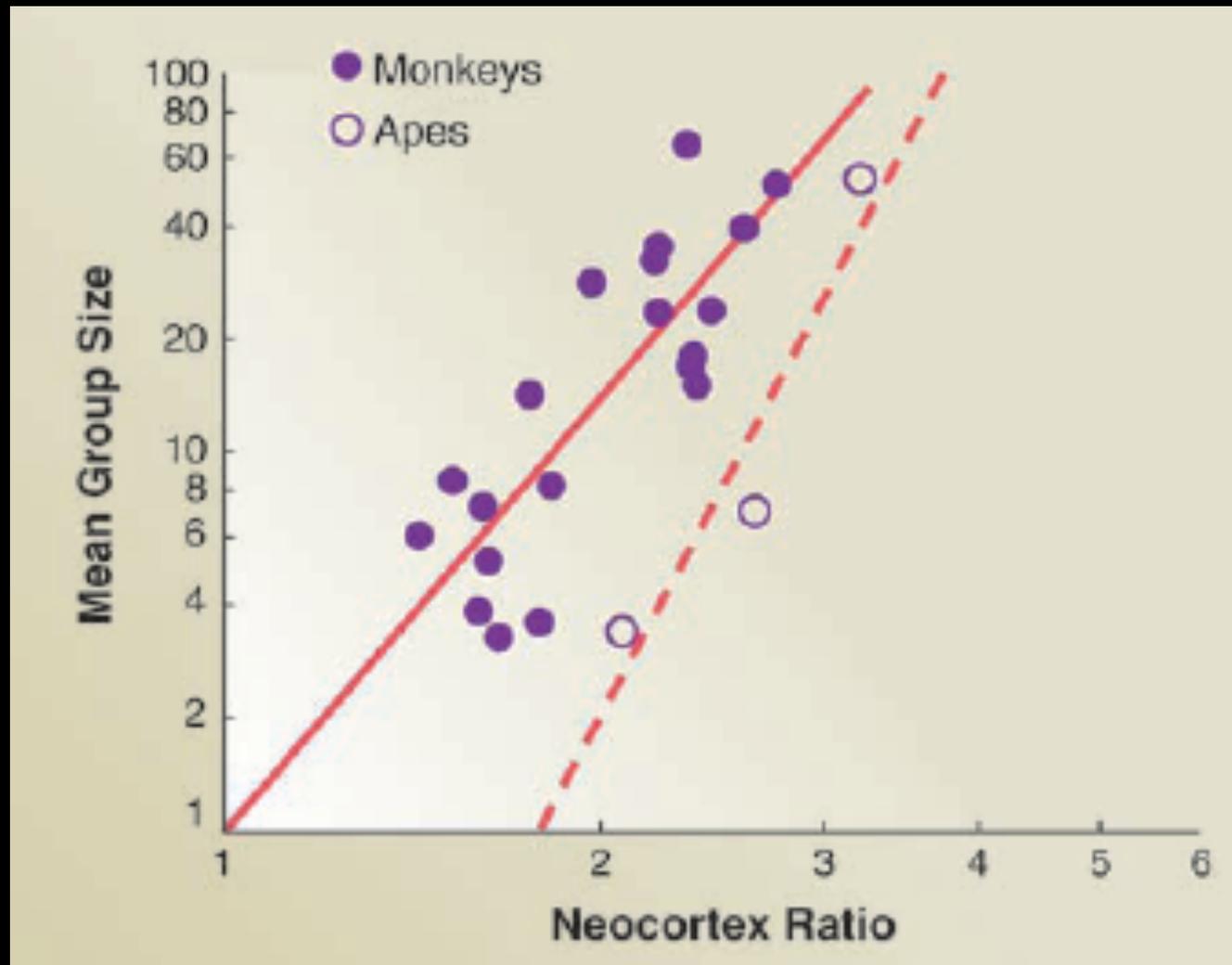


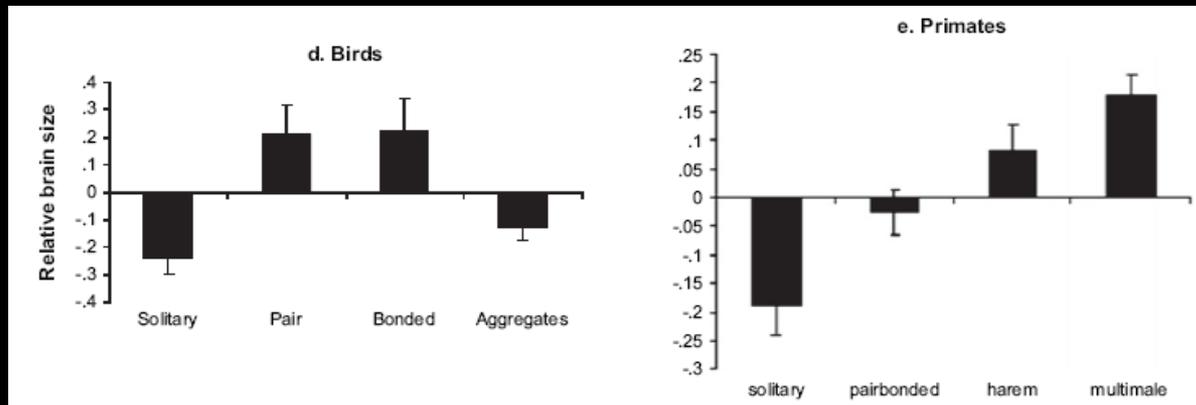
fine dell'evoluzione biologica, inizio dell'evoluzione culturale

Dimensione cerebrale e modalità di accoppiamento



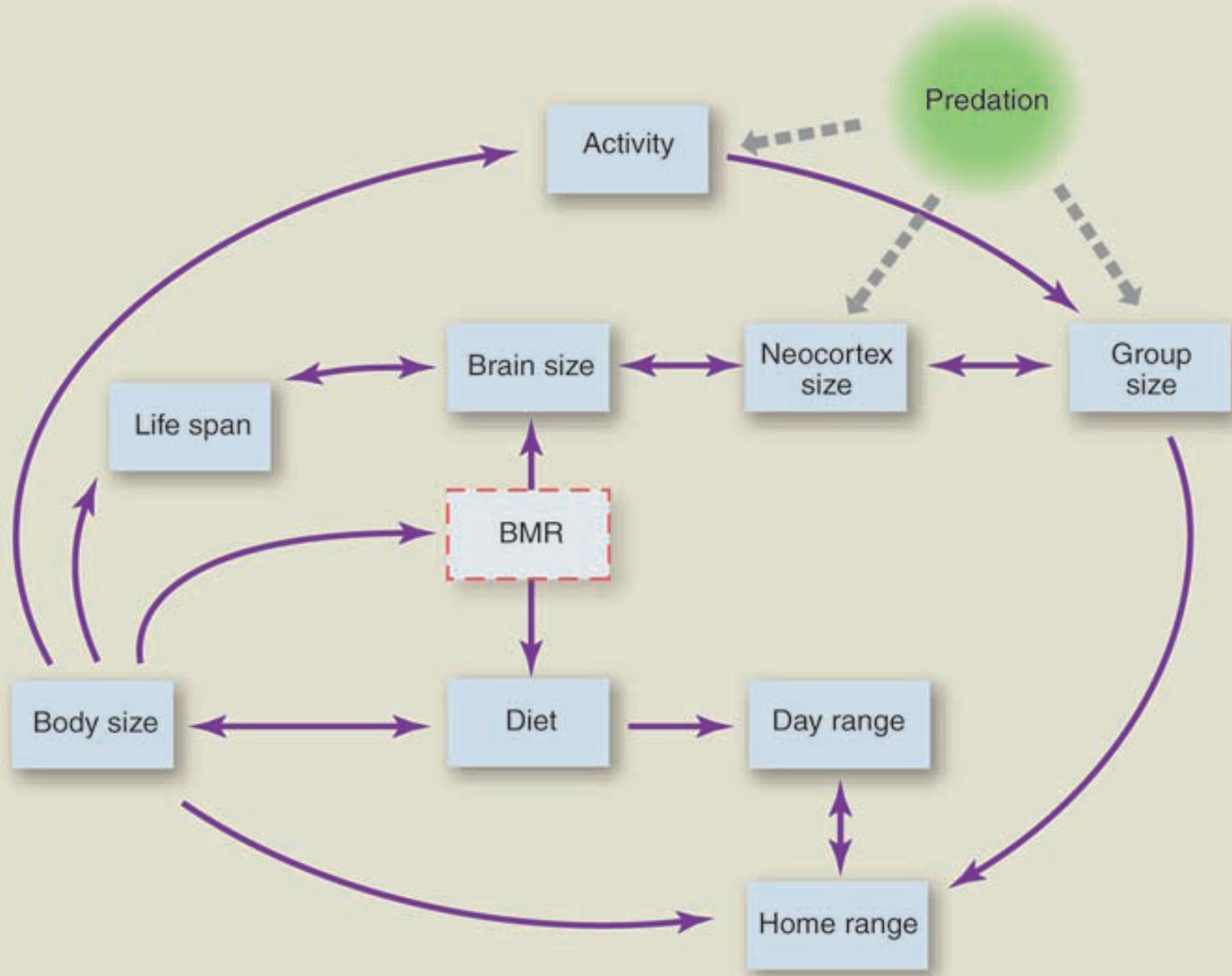
Dimensione cerebrale e dimensione del gruppo sociale



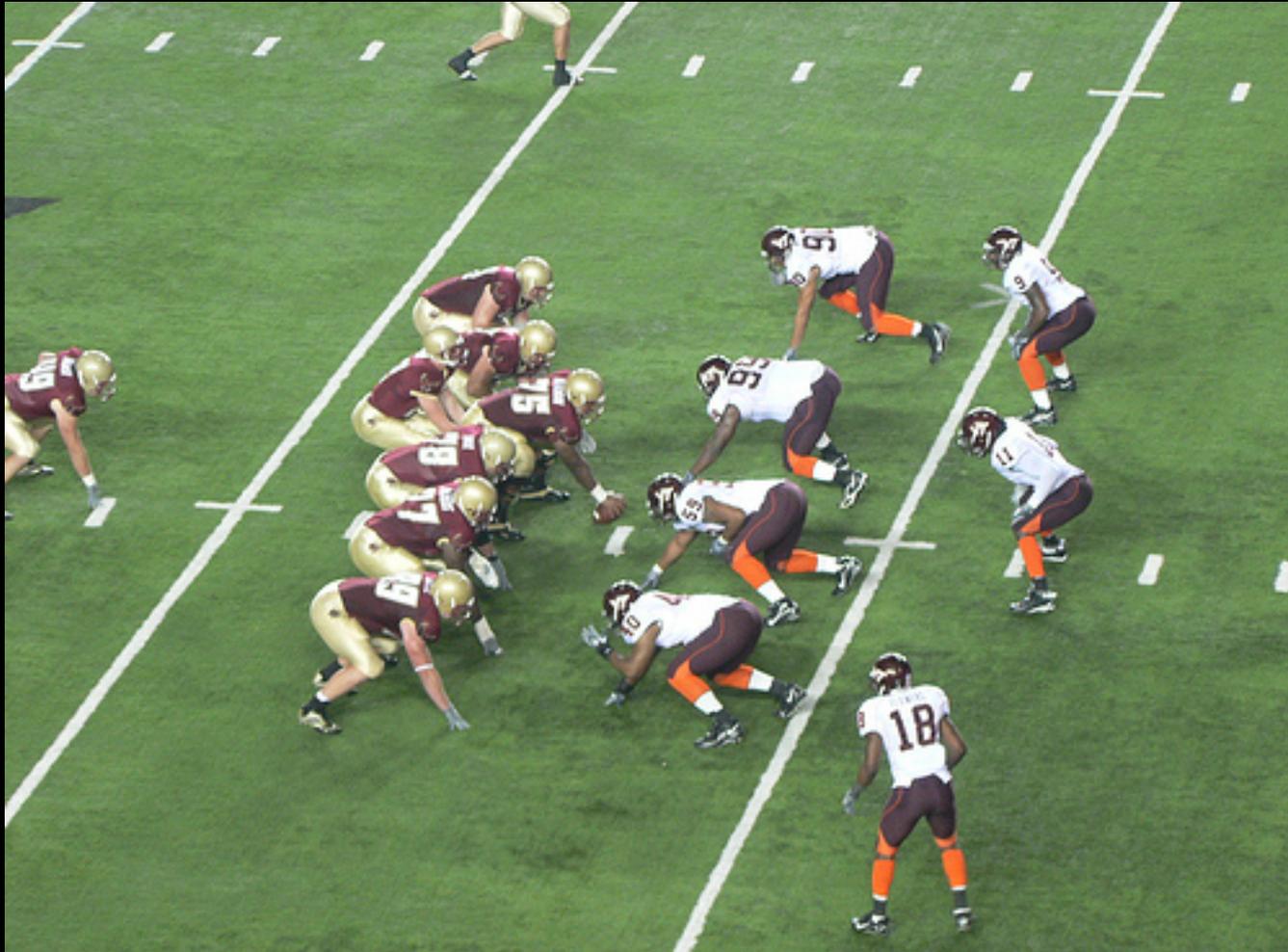


Uccelli/mammiferi = relazione *qualitativa* fra dimensione cerebrale e modalità di accoppiamento

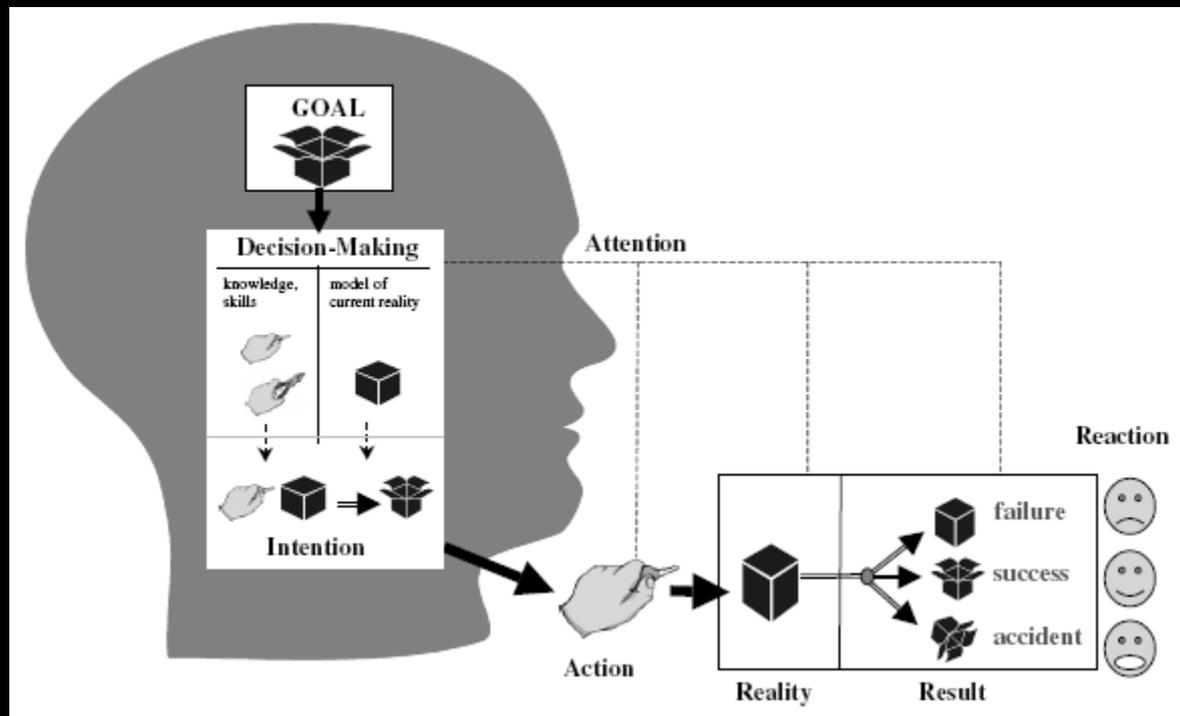
Primati = relazione *quantitativa* fra dimensione cerebrale e dimensione del gruppo sociale



Interazione sociale: competizione vs cooperazione

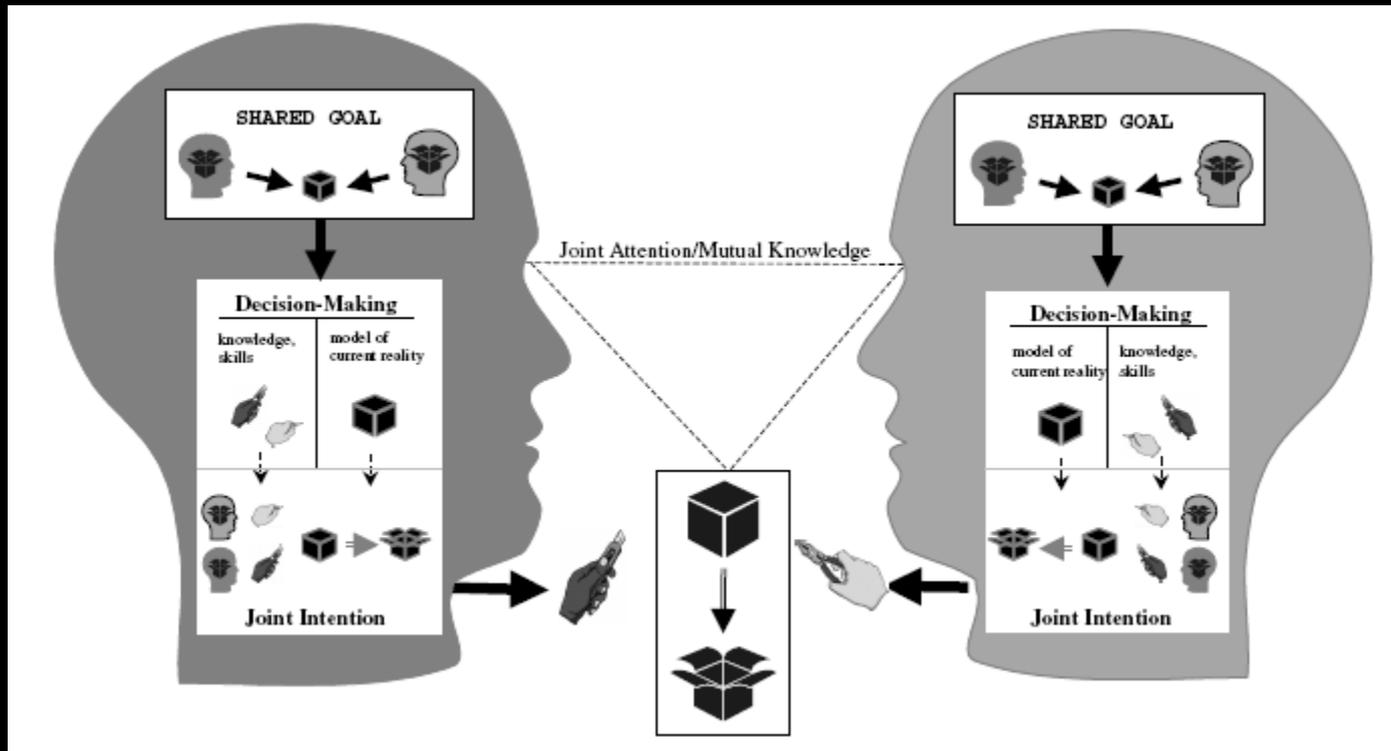


Intenzionalità e pianificazione



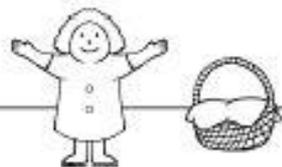
intenzionalità condivisa

pianificazione collaborativa

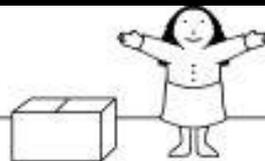




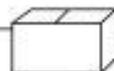
So quel che pensi: la teoria della mente



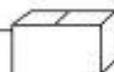
This is Sally.



This is Ann.



Sally has a ball. She puts it into her basket.



Sally goes out for a walk.
Ann takes the ball out of the basket.

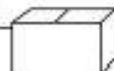


Ann then puts the ball in the box.

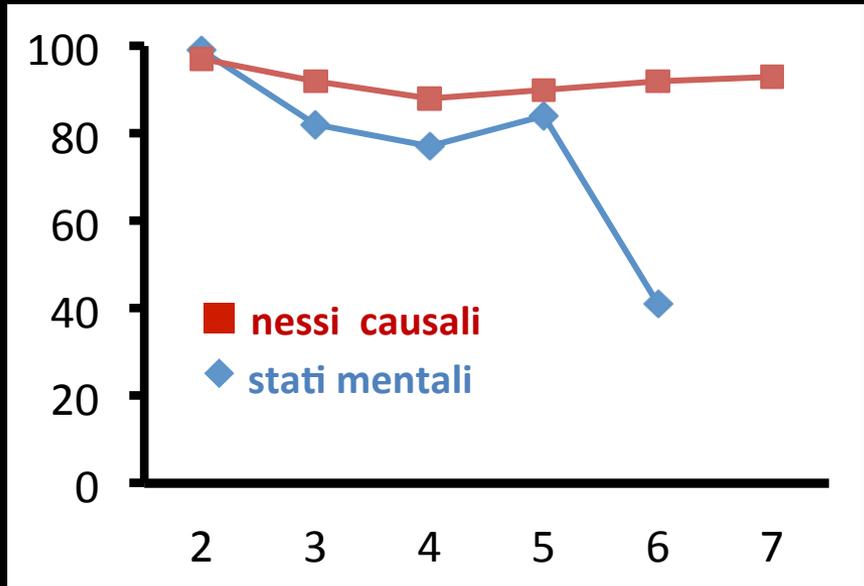
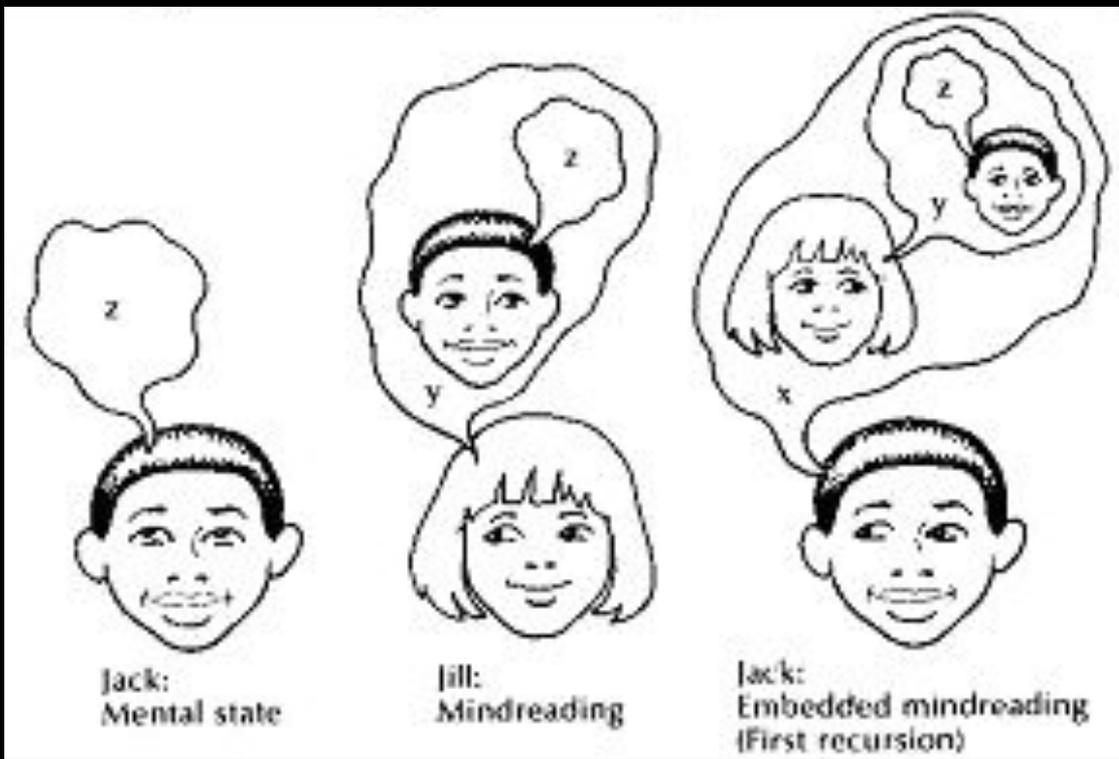
Now Sally comes back.



She wants to play with the ball.



Where will Sally look for the ball?





**Shakespeare vuole (1)
che il pubblico comprenda (2)
che Iago agisce (3)
in modo che Otello creda (4)
che Desdemona lo tradisce (5) con Cassio**



Aiutare gli altri a raggiungere il proprio scopo
(agendo in loro favore)

Condividere le risorse con gli altri

Informare gli altri su fatti o cose di loro interesse

Aiutare gli altri a raggiungere il proprio scopo (agendo in loro favore)

Out-of-reach



A person accidentally drops an object on the floor and unsuccessfully reaches for it.

Physical Obstacle



A person wants to put a pile of books into a cabinet, but she cannot open the closed doors because her hands are full.

Wrong Means



An object drops through a hole into a box and the person unsuccessfully tries to grasp it through the small hole, ignorant of a flap on the side of the box.

Condividere le risorse con gli altri



Informare gli altri su fatti o cose di loro interesse



Of course humans are not cooperating angels; they also put their heads together to do all kinds of heinous deeds. But such deeds are not usually done to those inside *the group*. Indeed, recent evolutionary models have demonstrated what politicians have long known: the best way to motivate people to collaborate is to identify an enemy and charge that *they* threaten *us*. The remarkable human capacity for cooperation therefore seems to have evolved mainly for interaction within the local group: Such group mindedness in cooperation is, perhaps ironically, a major cause of strife and suffering in the world today. The solution – more easily described than attained – is to find new ways to define the group

Michael Tomasello (2009)