Main Points

1) Recap from 20 November

2) Mortality and senescence

3) Brain-size allometries
   -- the evolution of social flexibility
   -- example: brain size and allomaternal care
   -- example: brain size, anti-predator defense, and lifespan in the Bovidae
   -- example: brain size and social flexibility in Primates

4) Leadership in human and non-human mammals

Pre-Reading: Wed 29 Nov = NA
Weds 6 Dec = Brown et al 2014

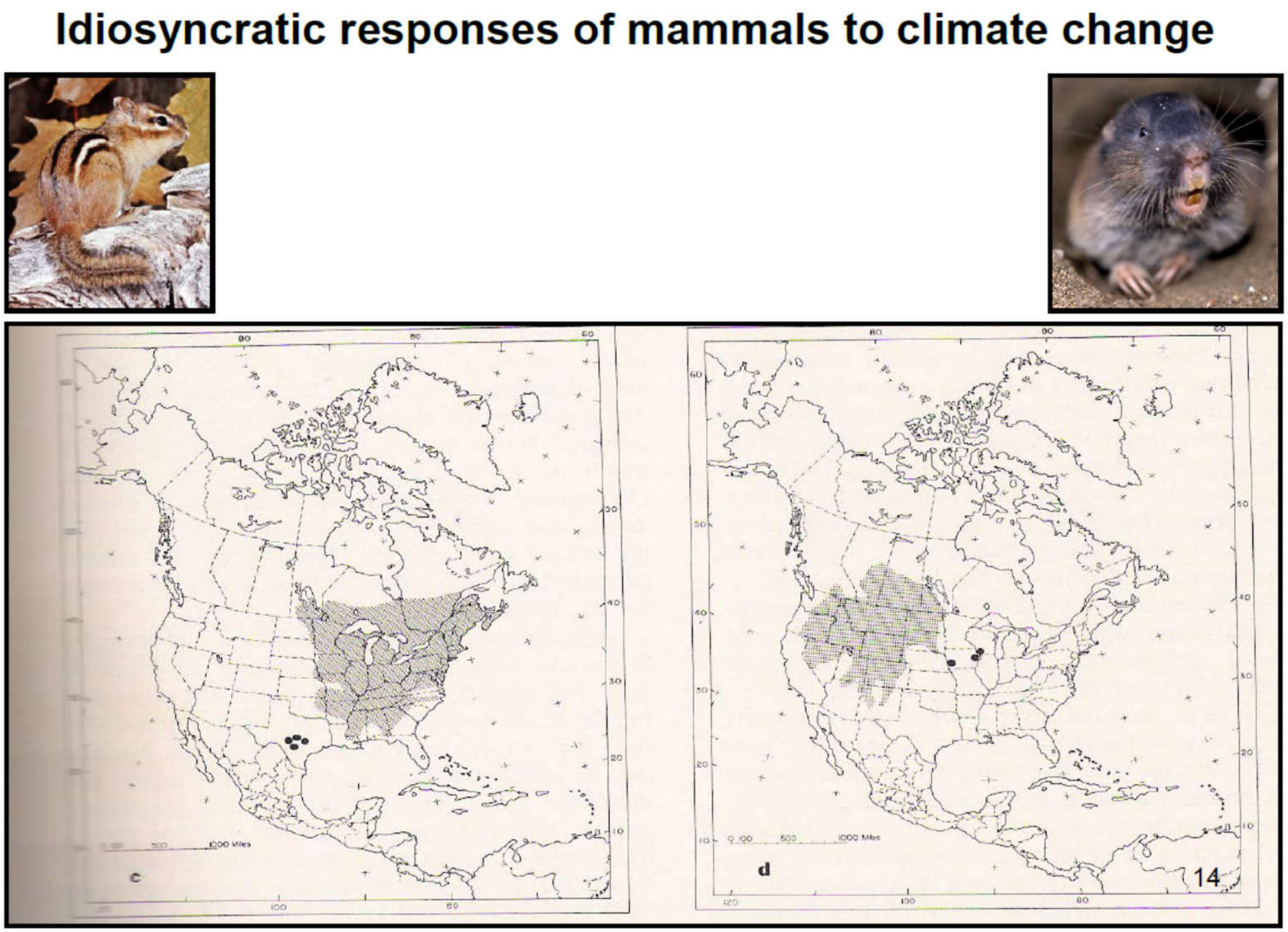
Monday 4 Dec = optional test 3. If you opt to take this test, it's 67 points. If you opt out, the average score from your test 1 and test 2 will be your grade for test 3 (out of 67).

Class starts at 130pm Wednesday 6 Dec.

Final is Monday 18 December at 115pm in this room. Final is cumulative. There will be a Q&A session Monday 11 December at 110pm in this room. Come with questions.

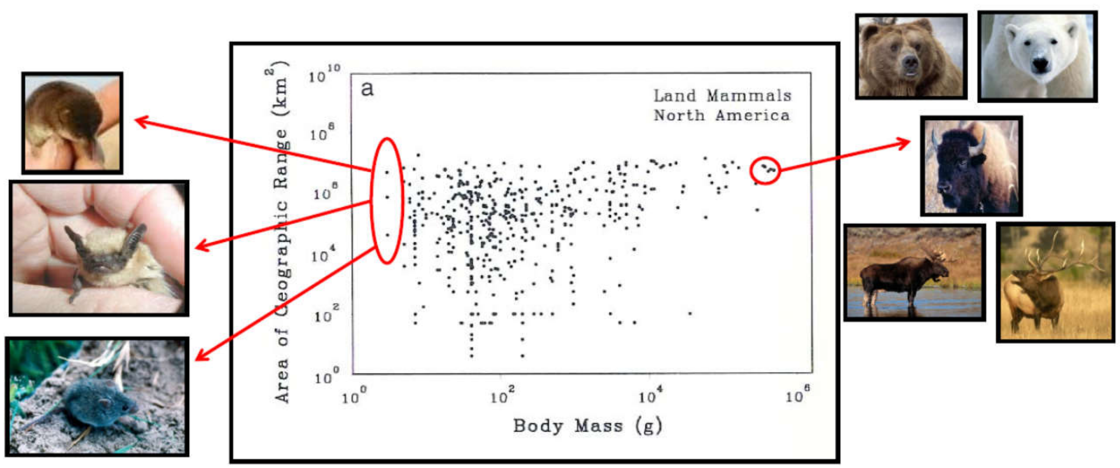
Terms: extrinsic mortality, intrinsic mortality, senescence, allomaternal care, fission-fusion system, leadership, power

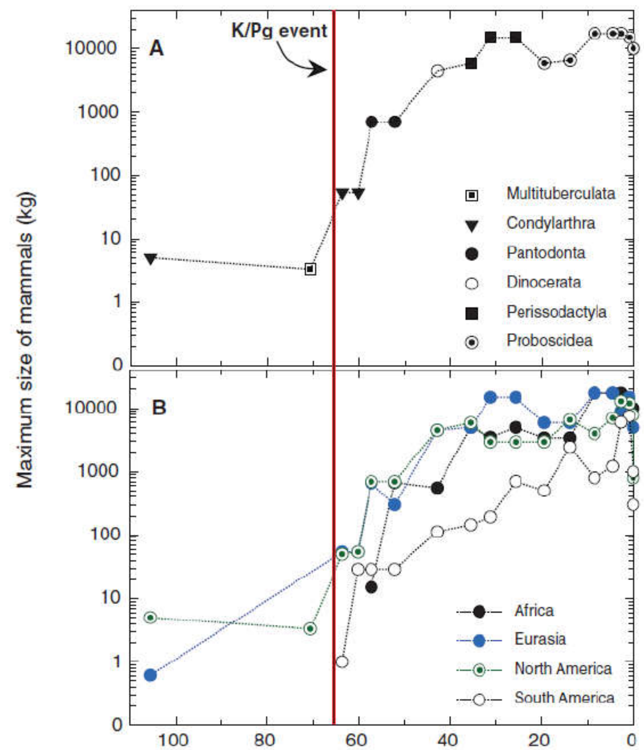
Lecture 18 recap: geographic range shifts from the Pleistocene demonstrate why it might be difficult to predict (accurately) how distributions of contemporary mammals will be affected by climate change.



Lecture 18 recap: maximum body size of mammals increased following extinction of the dinosaurs. It is likely that resource requirements imposed by physical area constrain maximum body size of mammals.

Indricotherium





Smith et al 2010

Why do we get old and die of “natural causes”?

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-- <u>intrinsic mortality</u> = mortality occurring due to <u>senescence</u>, the body's deterioration with age.

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-- the ability of natural selection to “weed out” genes that increase intrinsic mortality (or decrease fertility) declines with age.

-- this results in strong selective pressure to decrease intrinsic mortality (or increase fertility) early in life, but not late in life.

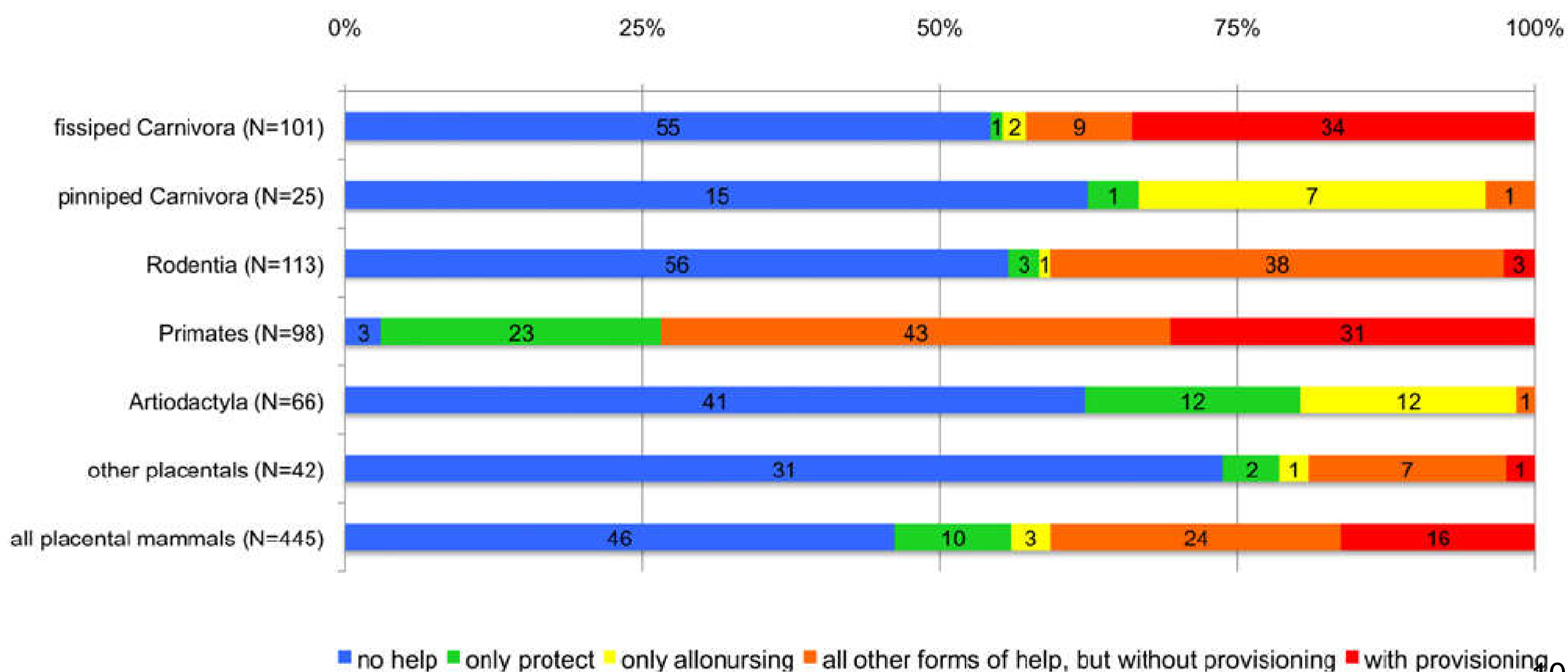
Why do we get old and die of “natural causes”?

-- so, any behaviors that mammals can employ to decrease *extrinsic* mortality should increase selective pressure to decrease *intrinsic* mortality and delay senescence.

-- what are examples of some of these behaviors?

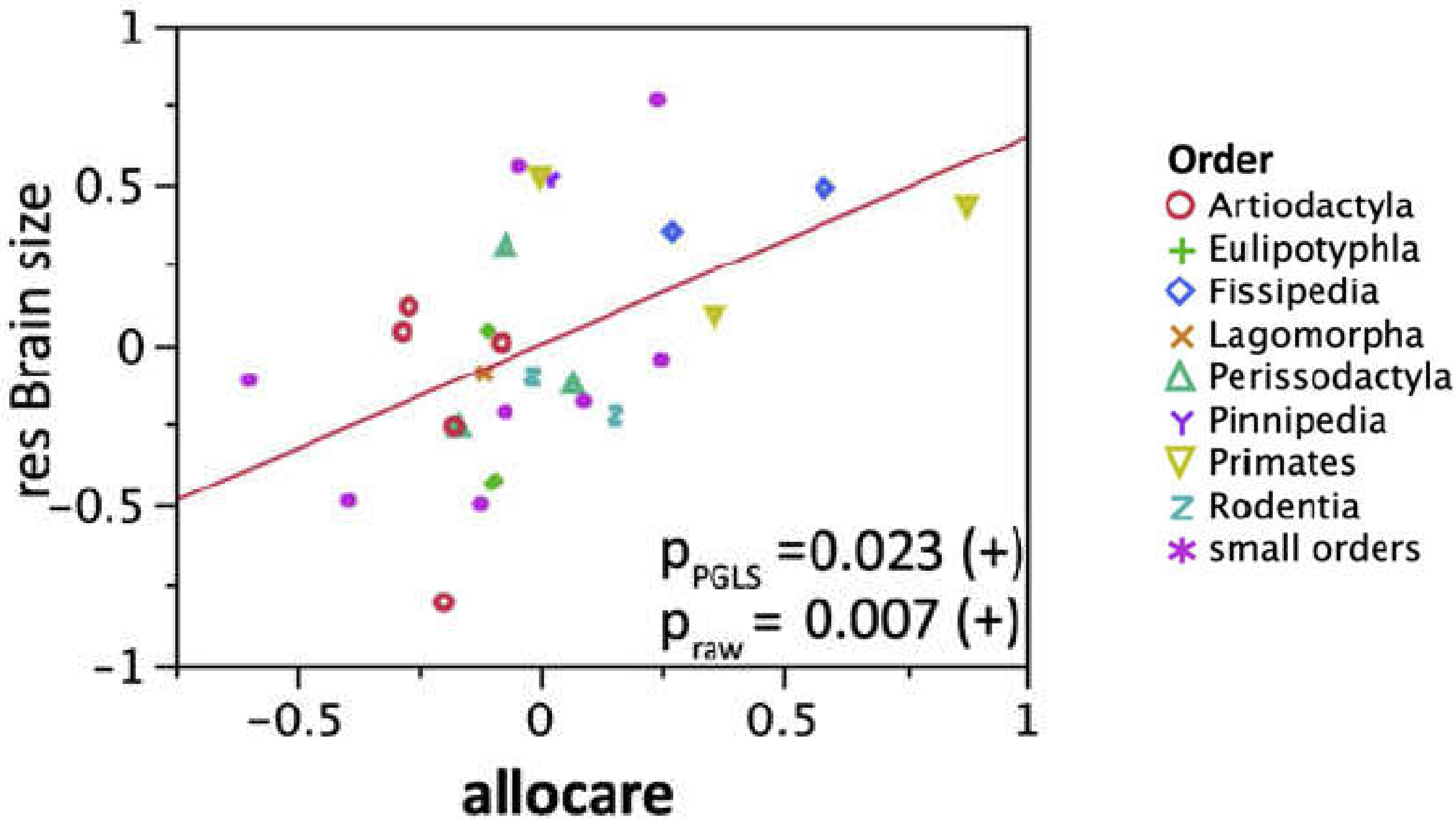
Brain size, allomaternal care, and longevity

-- allomaternal care = care provided to young by non-maternal individuals.



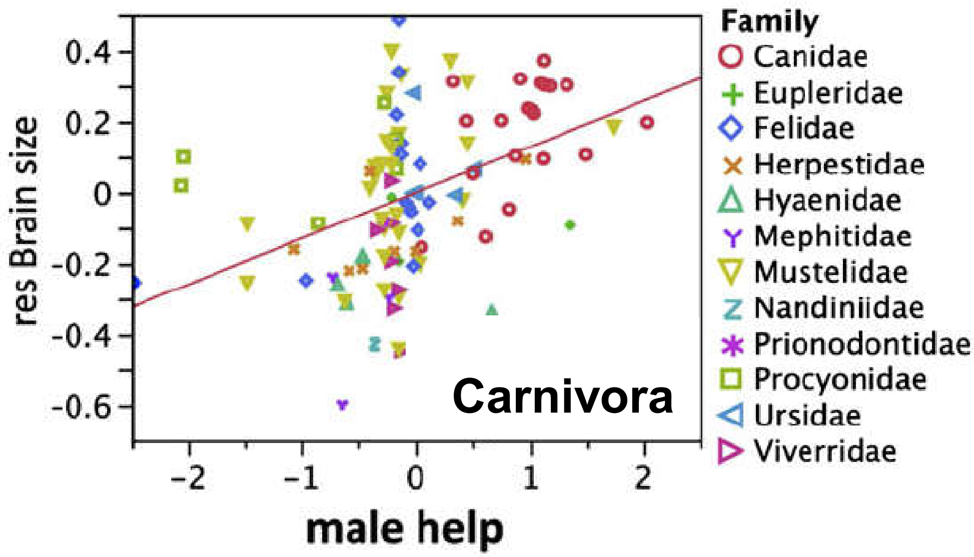
Brain size, allomaternal care, and longevity

-- allomaternal care increases with residual (relative) brain size in mammals.



Isler et al 2012

Brain size, allomaternal care, and longevity



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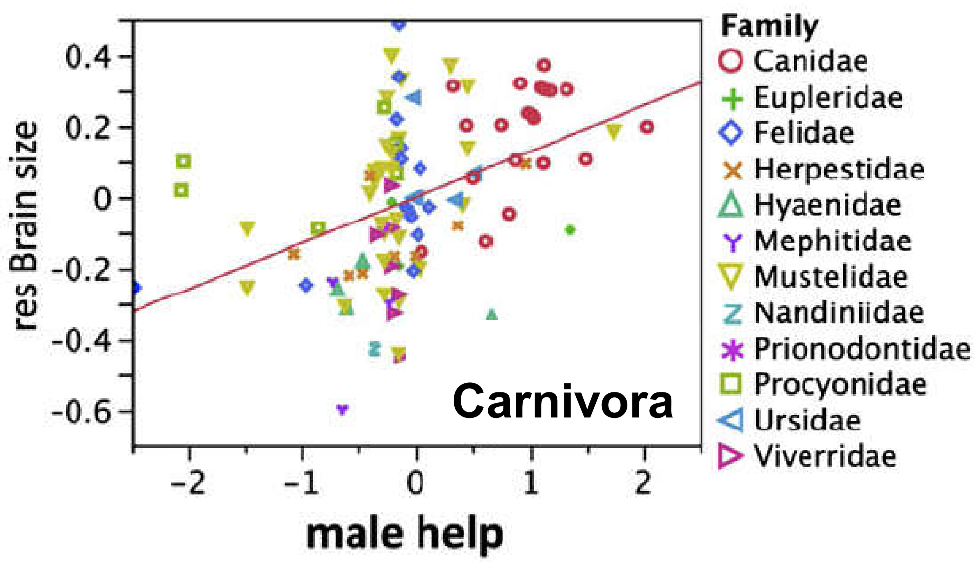

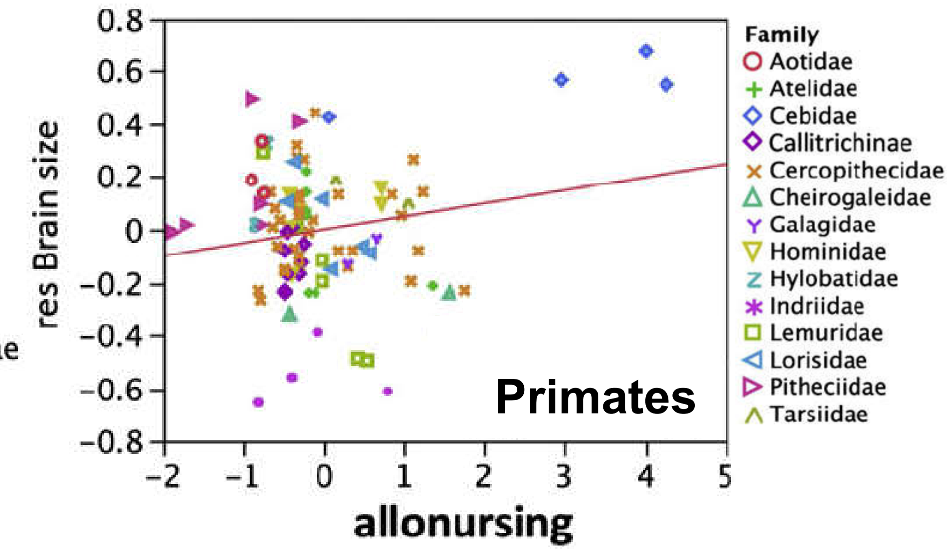

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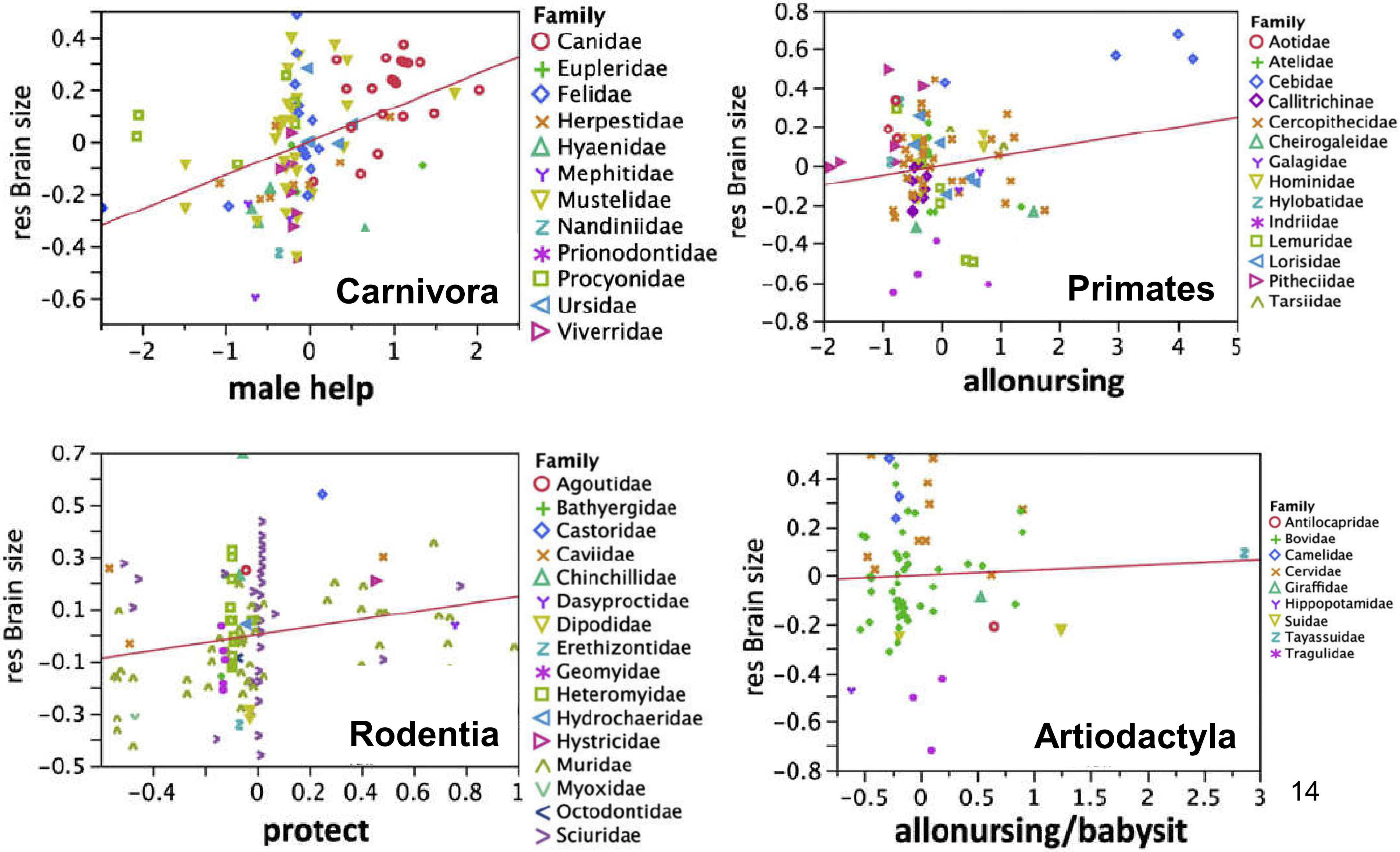
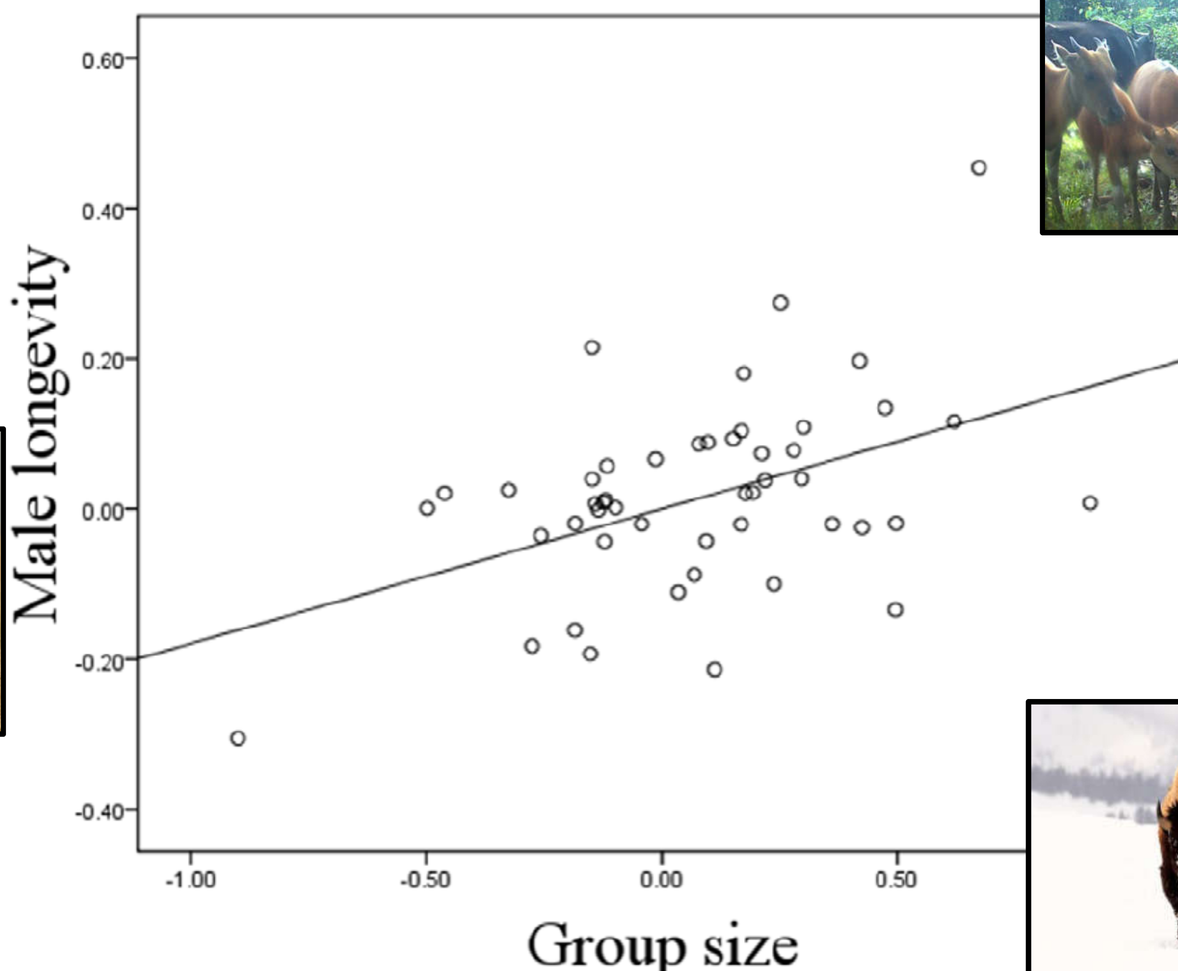


Brain size, anti-predator defense, and longevity

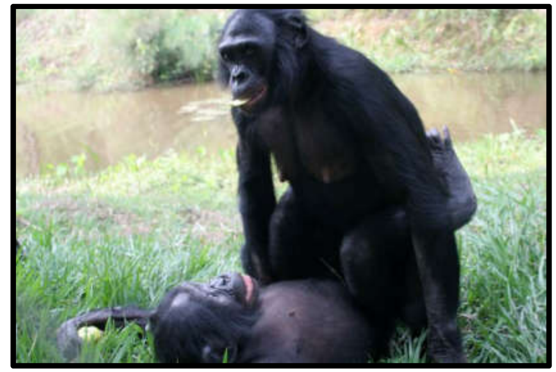


Bro-Jorgenson 2012

Brain size, social flexibility, and longevity

-- variation in "social organization flexibility": the size, sexual composition, and cohesion of primate societies.

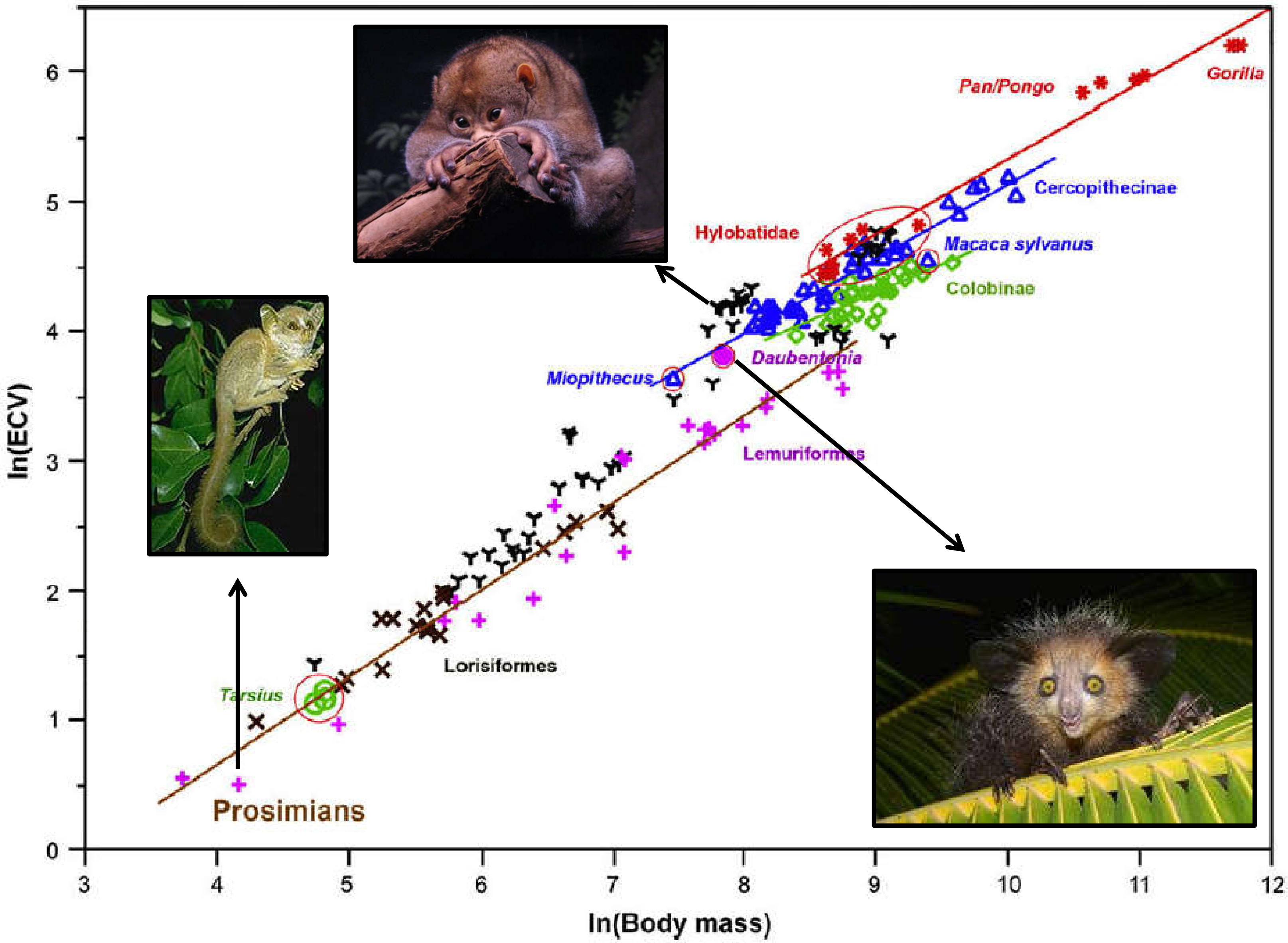
bonobos



golden snub-nosed monkeys

Phillipine tarsiers

Brain size, social flexibility, and longevity



Brain size, social flexibility, and longevity

-- <u>fission-fusion system</u> = one in which size and composition of a social group changes as individuals merge (fusion) or split (fission) with other individuals through time.

black and white ruffed lemur

common chimpanzees with bush piglet

Geoffrey's spider monkey

Leadership in mammals

-- <u>leadership</u> = a non-random effect on group behavior of conspecifics through actions evolved or intended to elicit this effect, often through power.

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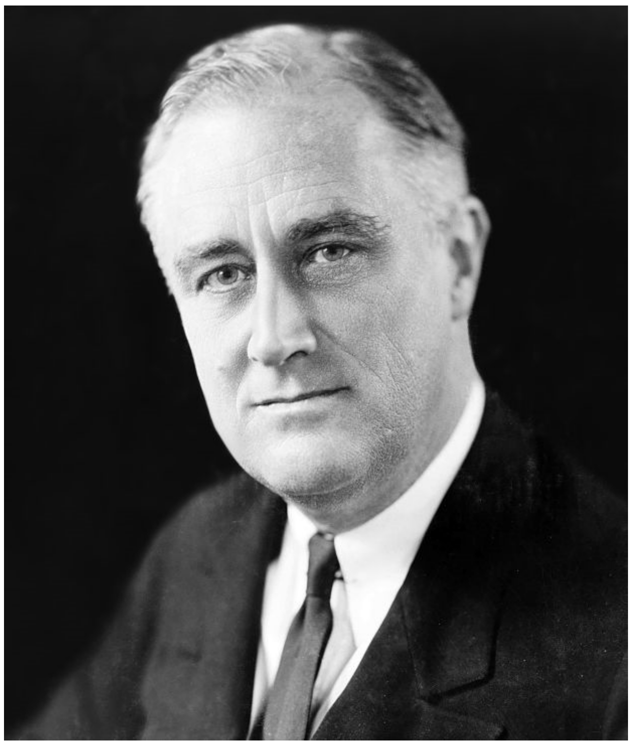
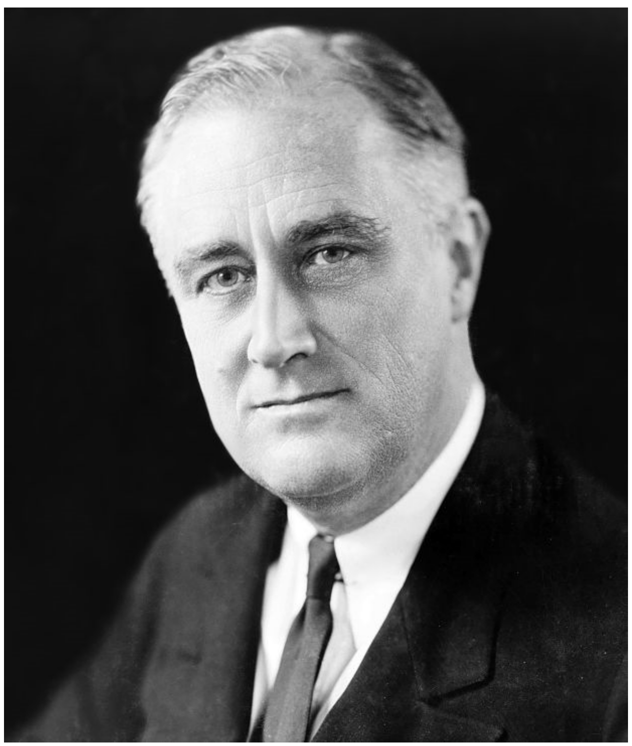
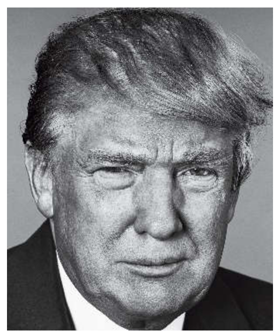


Discussion Q: leaders tend to influence four "types" of group behavior. What might these be?

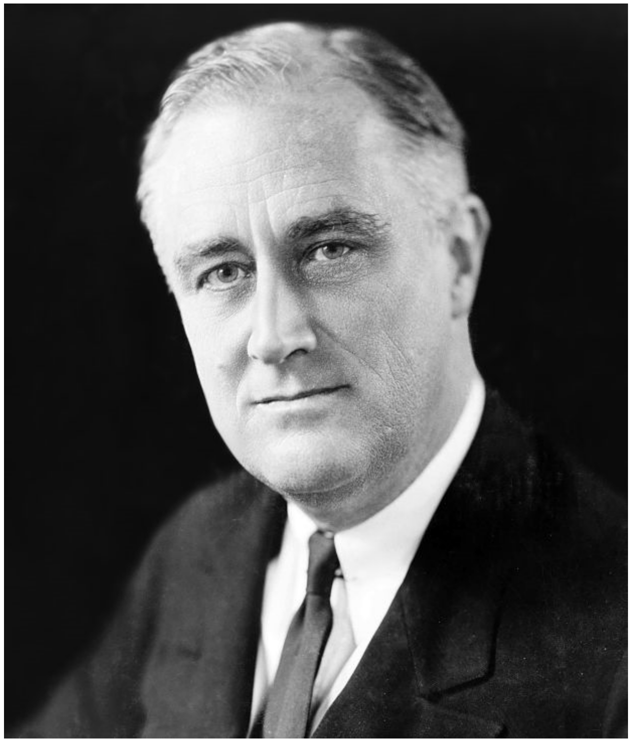




Leadership in mammals

-- types of group behavior influenced by leaders include movement, food acquisition, within-group conflict mediation, and between-group interactions (including war).

-- how does leadership vary across human and non-human mammals?



How powerful is the leader?

Power	1 = weak or non-existent (adult autonomy, highly democratic decision-making, etc.) 2 = delegated leadership (leaders coordinate or execute decisions most or all agree to) 3 = moderate power (roughly the midpoint between codes 1 and 5) 4 = leaders can coerce or persuade many but not all, or often but not consistently 5 = despotic (leaders consistently coerce or persuade others to follow)

Smith et al. 2015.

Non-human leaders tend to be more powerful/influential in their groups

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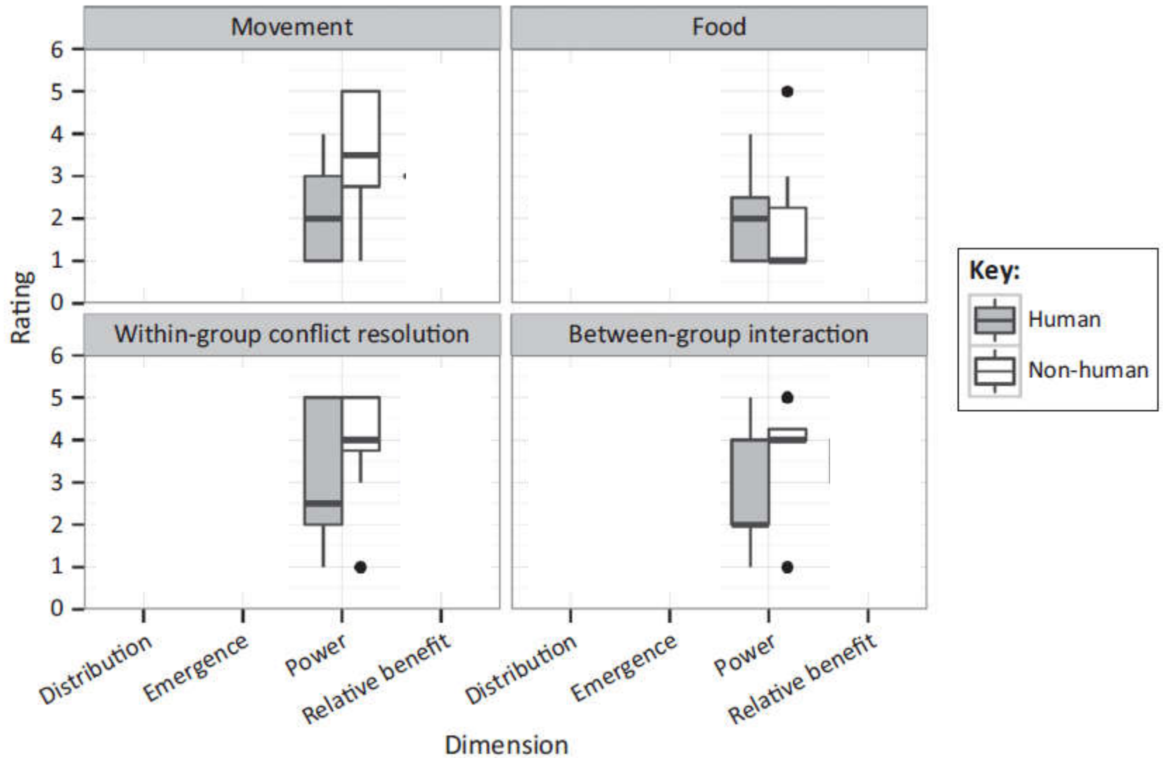

Smith et al. 2015.

How do individuals become leaders?

Emergence	1 = leadership fully achievement-based (includes cases where adults are autonomous) 2 = primarily achievement-based (e.g., adults of one age or sex category usually lead, but otherwise leadership is achievement-based) 3 = roughly equal mix of achieved and ascribed (e.g., most competent senior males lead) 4 = primarily ascribed (e.g., leadership inherited by a senior member of chief's family) 5 = fully ascribed (e.g., senior female always leads)

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Leadership in humans and non-humans is mostly based on achievement, but there is a tendency for leadership to be more achievement based in non-human mammals

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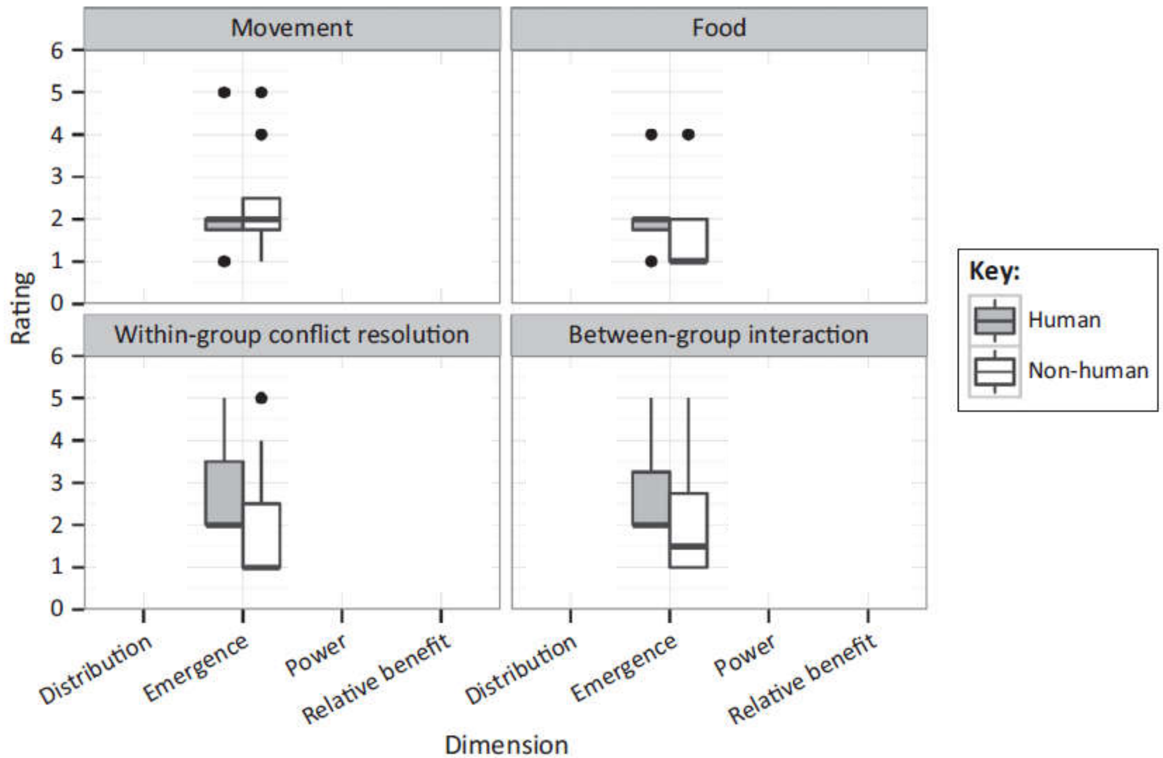

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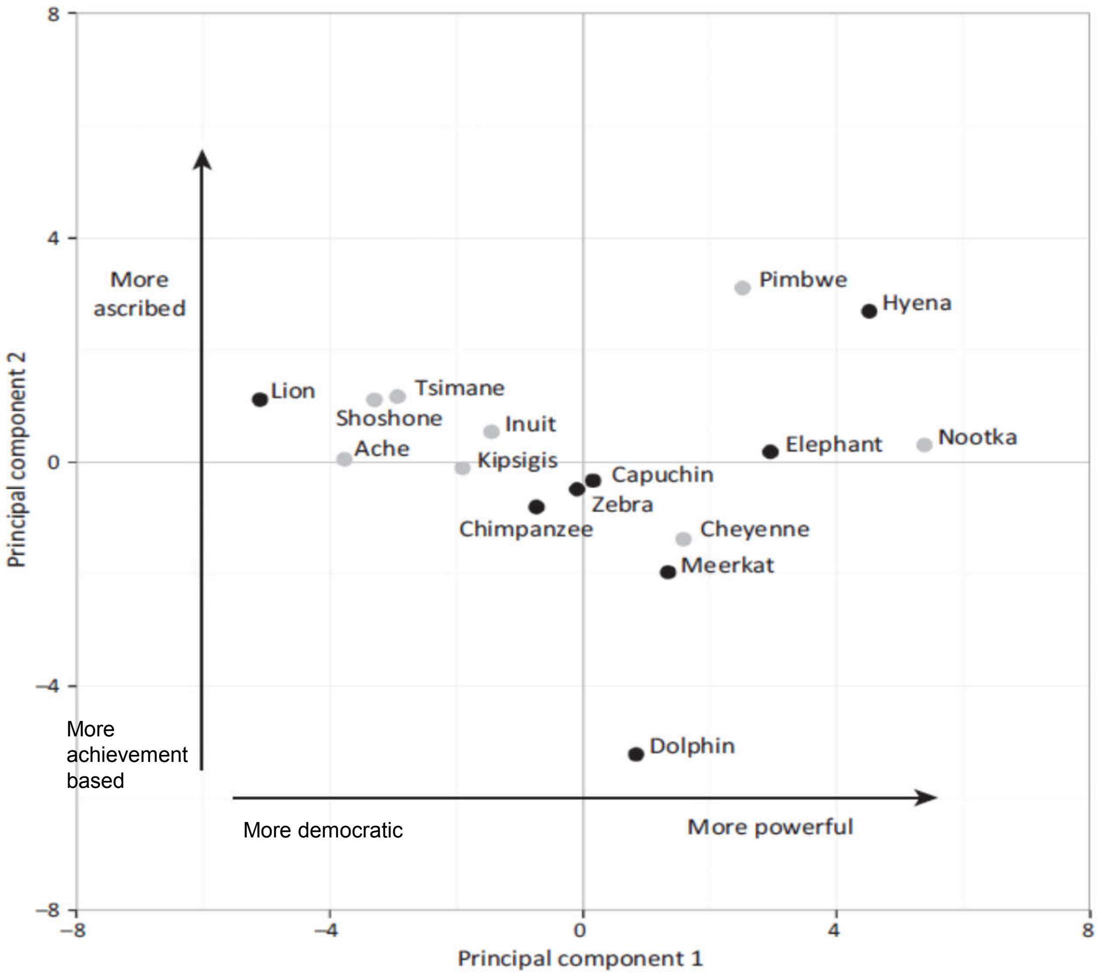
Leadership in mammals



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