

Main Points

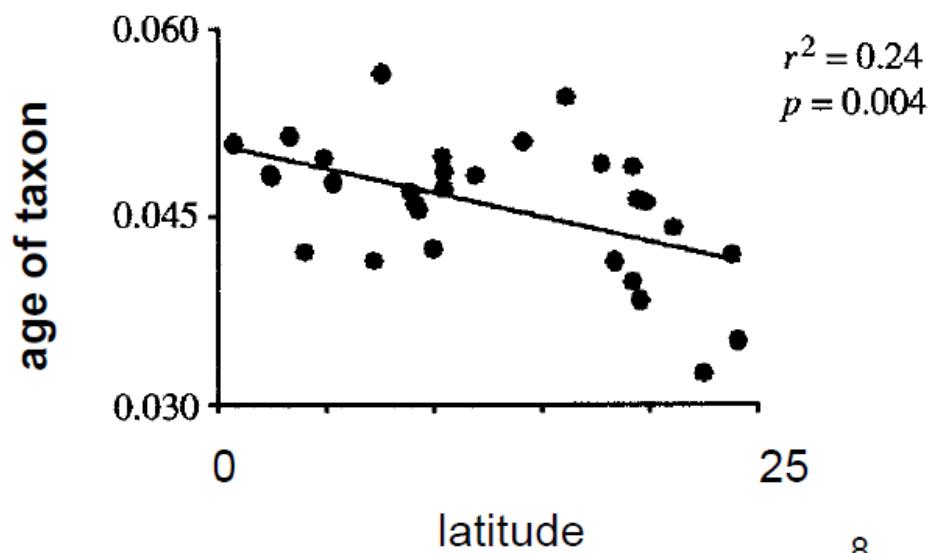
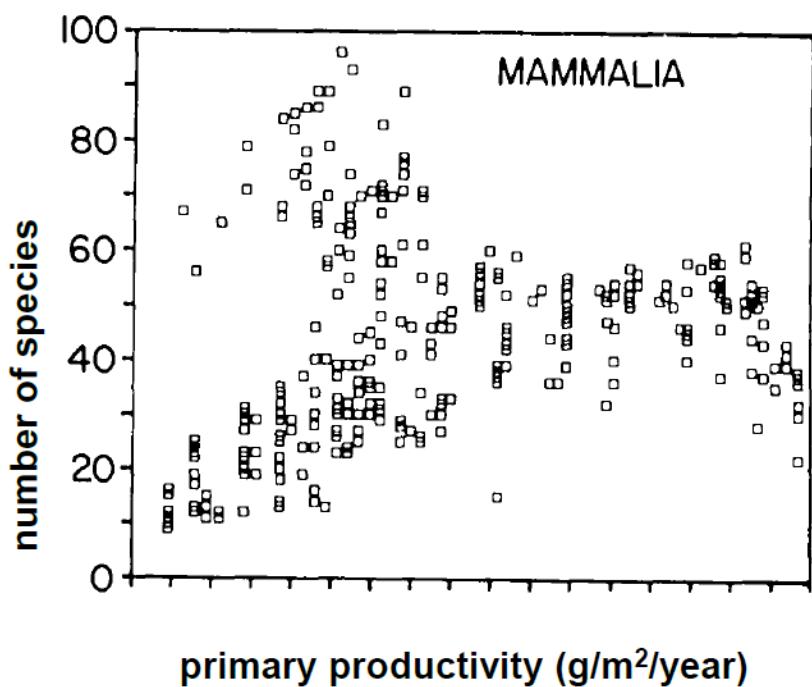
- 1) Recap from 18 November
- 2) Mortality and senescence
- 3) Brain-size allometries
 - the evolution of social flexibility
 - example: brain size and alloparental care
 - example: brain size, anti-predator defense, and lifespan in the Bovidae
 - example: brain size and social flexibility in Primates
- 4) Leadership in human and non-human mammals

Pre-Reading: Mon 30 Nov = NA
Weds 2 Dec = Brown et al 2014

Monday and Wednesday 7 and 9 Dec = optional test 3. If you are in Monday's lab and opt to take test 3, you are free to take test 3 between the hours of 2-5pm on Wednesday. Email Anne-Marie about when you will take the final. If you are in Wednesday's lab and opt to take test 3, you will take test 3 Monday at 110pm.

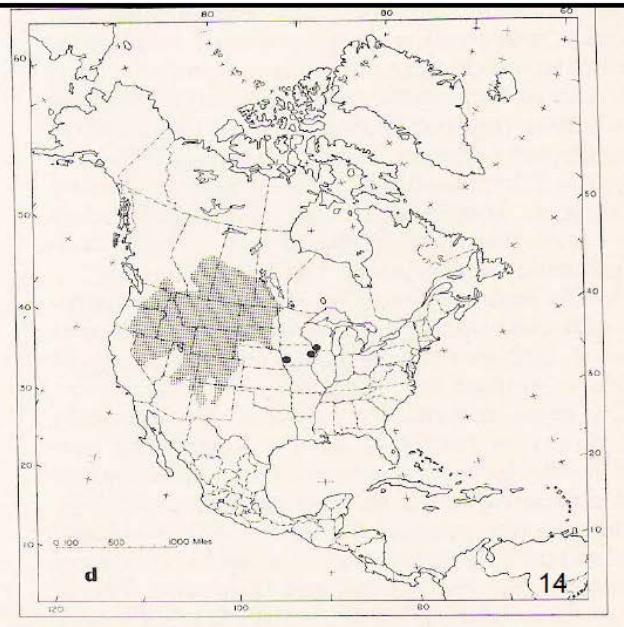
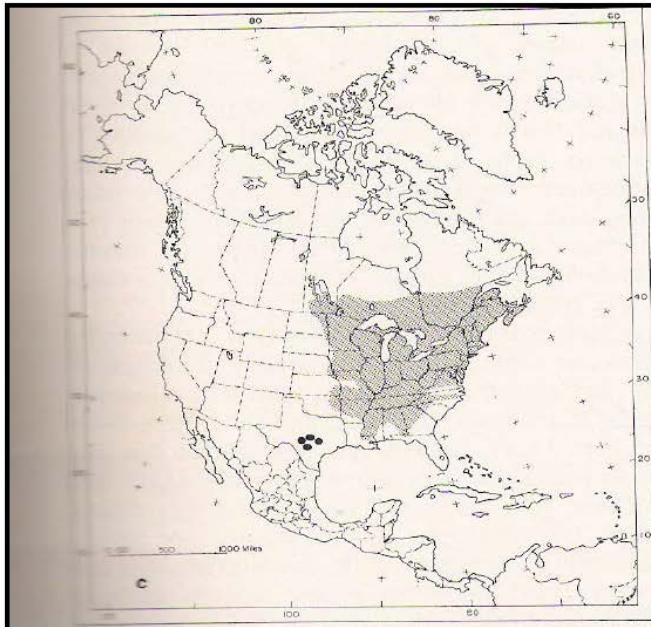
Terms: extrinsic mortality, intrinsic mortality, senescence, alloparental care, fission-fusion system, leadership, power

Lecture 18 recap: we discussed two broad types of hypotheses for latitudinal gradients, ecological and evolutionary hypotheses. We discussed an example of each.



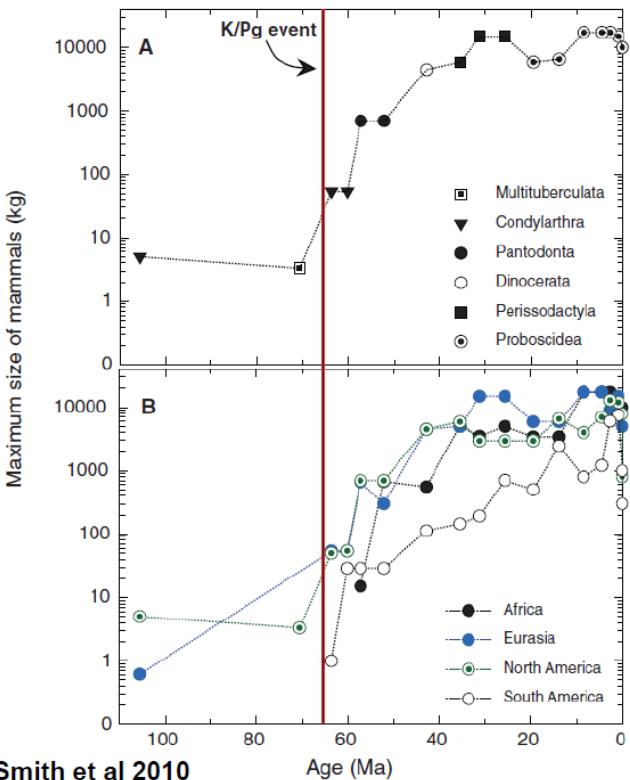
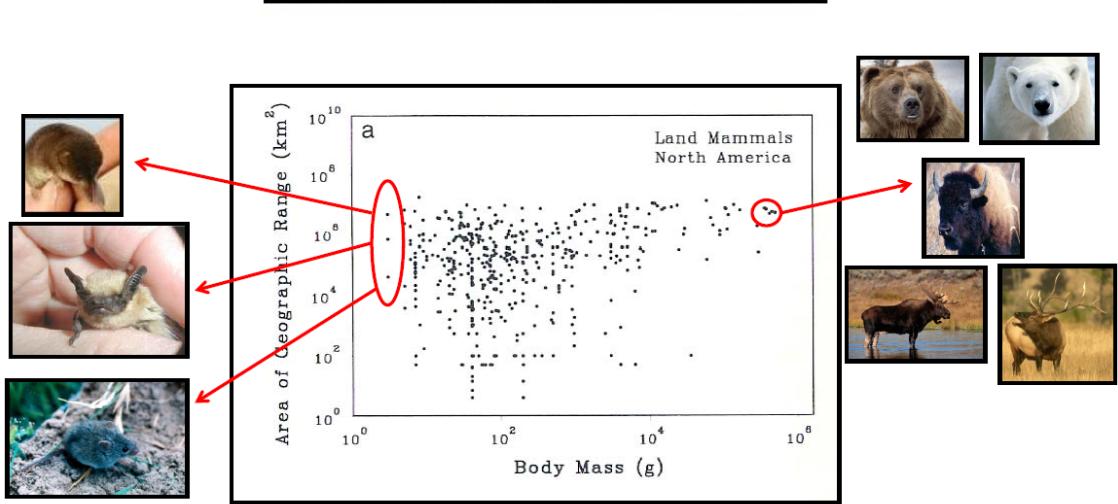
Lecture 18 recap: geographic range shifts from the Pleistocene demonstrate why it is difficult to predict how distributions of contemporary mammals will be affected by climate change.

Idiosyncratic responses of mammals to 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



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

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- **extrinsic mortality** = mortality imposed by environmental factors (predation, disease, resource shortages, etc).
- **intrinsic mortality** = mortality occurring due to senescence, the body's deterioration with age.

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-- extrinsic mortality is increasingly likely the longer an individual lives, so few individuals will live long enough to enjoy the advantage of reduced intrinsic mortality at old ages.



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- the ability of natural selection to “weed out” genes that increase intrinsic mortality (or decrease fertility) decline with age.
- this results in strong selective pressure to reduce intrinsic mortality (or increase fertility) early in life.



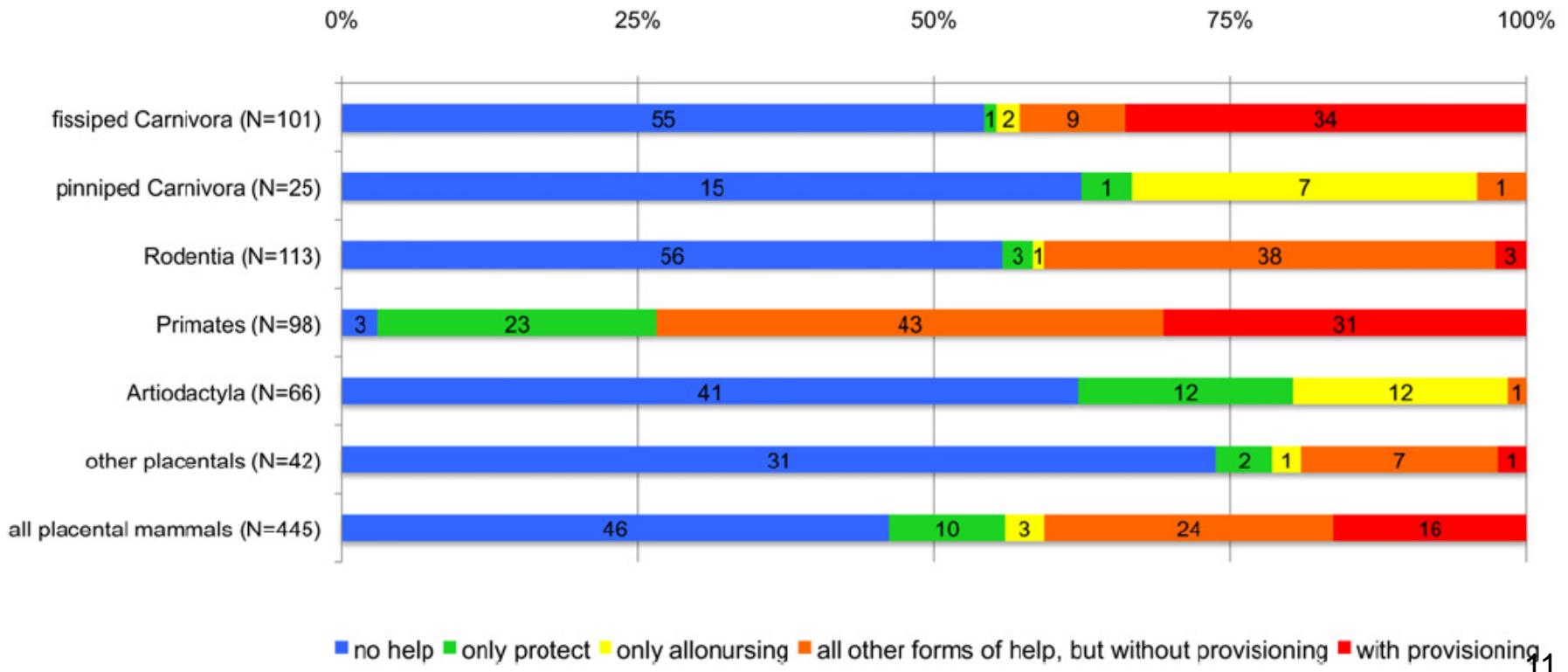
Why do we get old and die of “natural causes”?

- so, any behaviors that mammals can employ to reduce *extrinsic* mortality should increase selective pressure to decrease *intrinsic* mortality and delay senescence.
- what are examples of some of these behaviors?



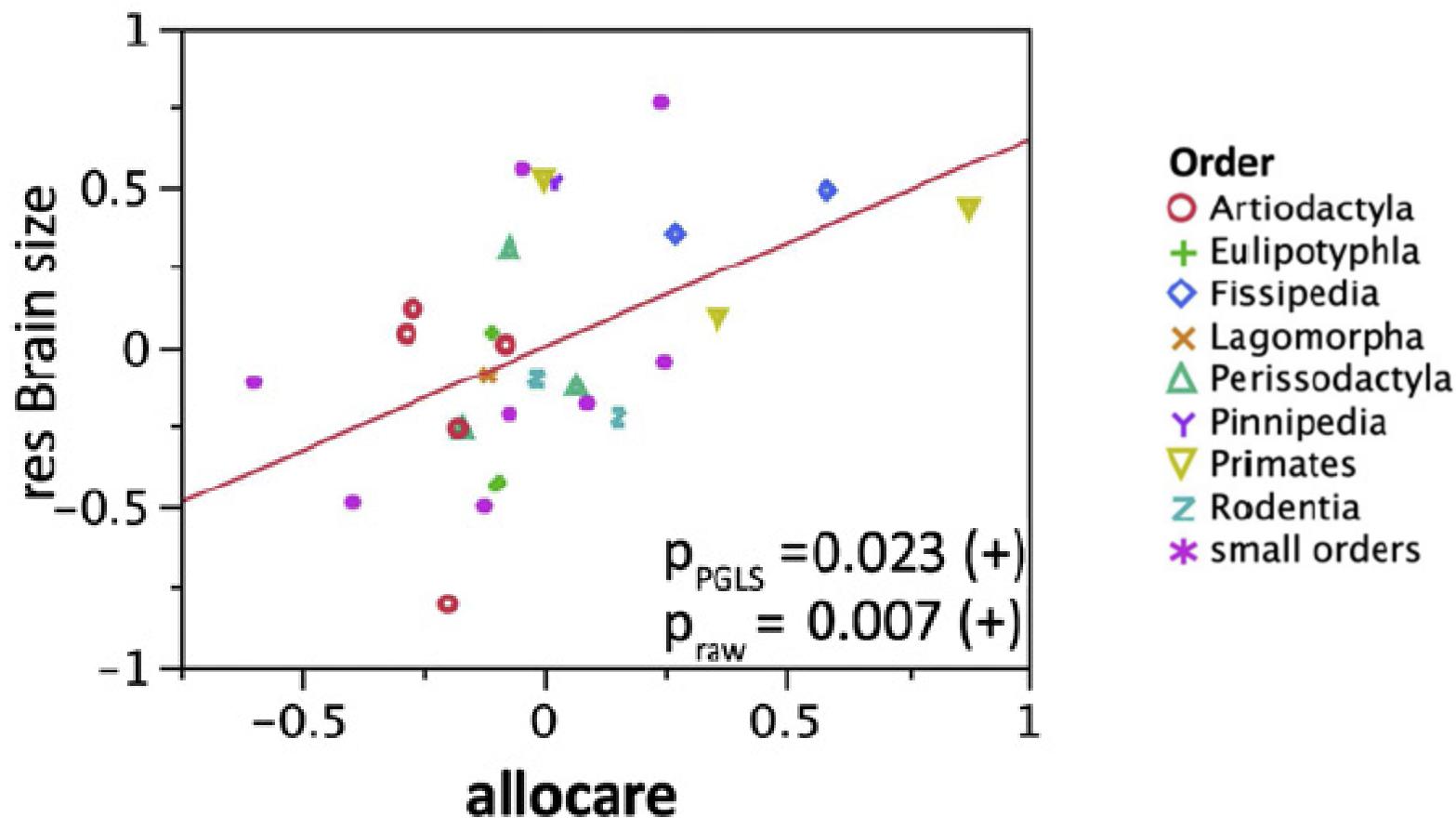
Brain size, allomaternal care, and longevity

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

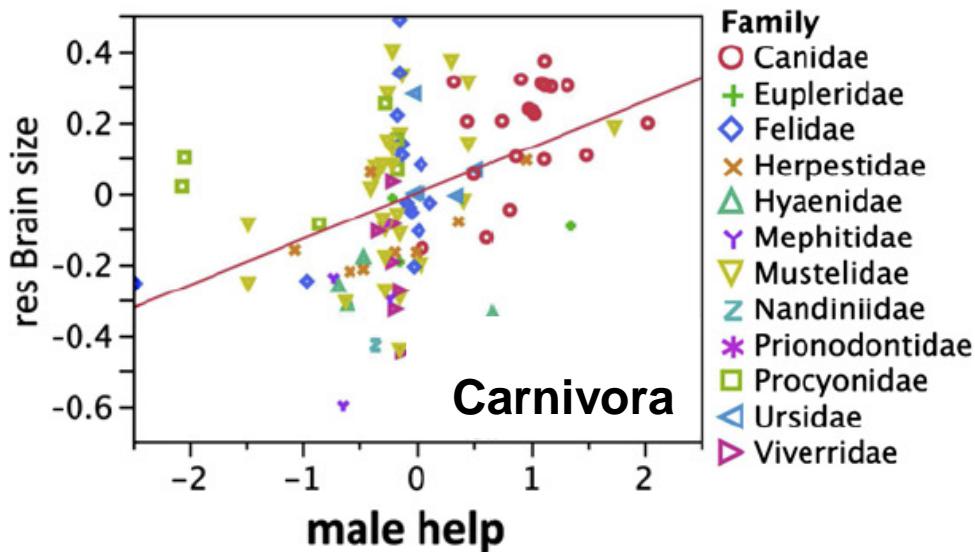


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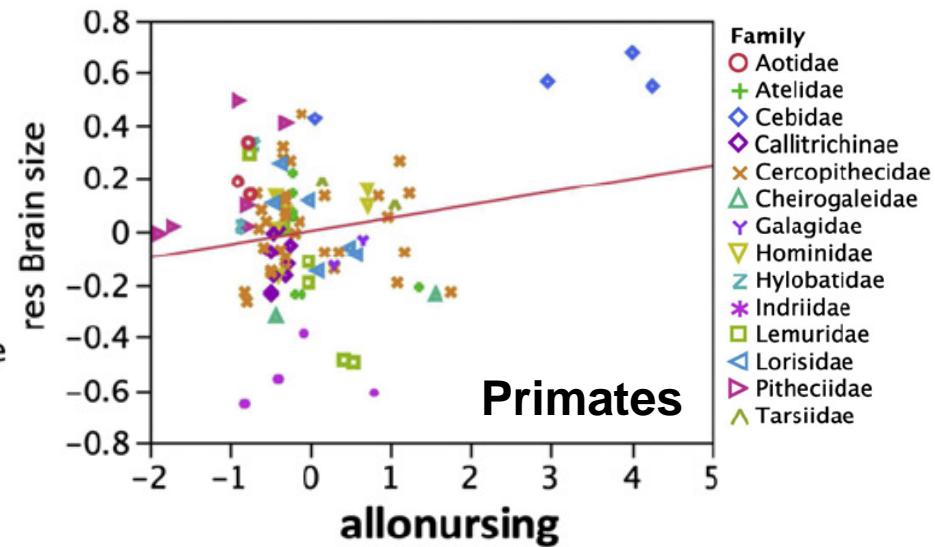
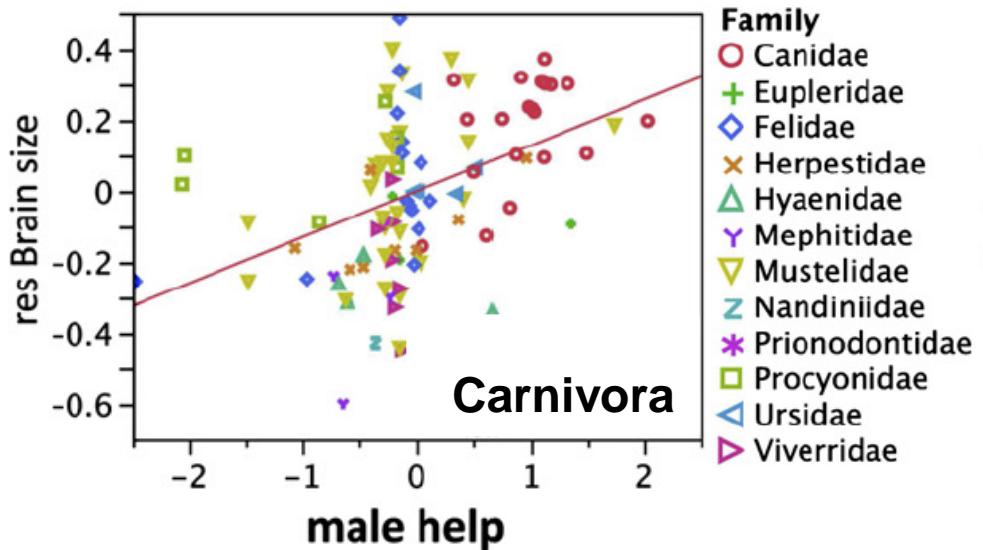
-- allomaternal care increases with residual (relative) brain size in mammals.



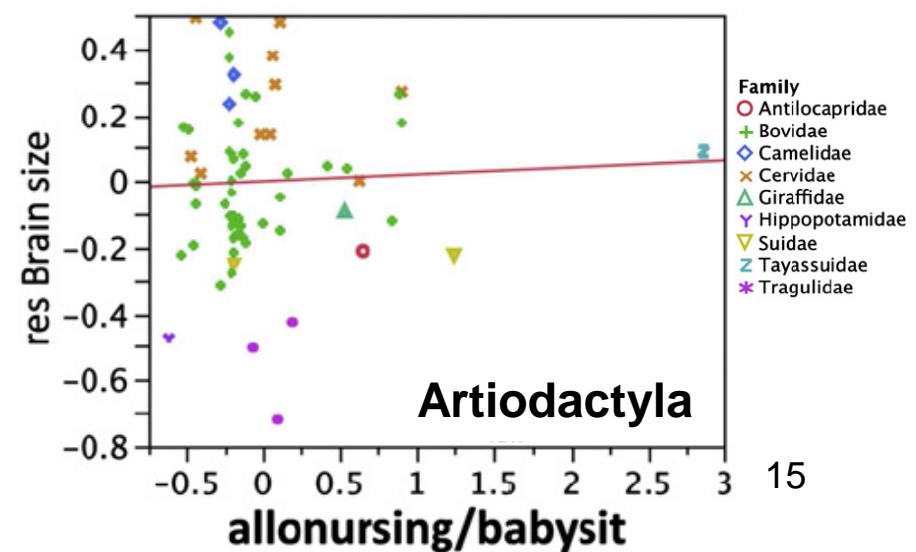
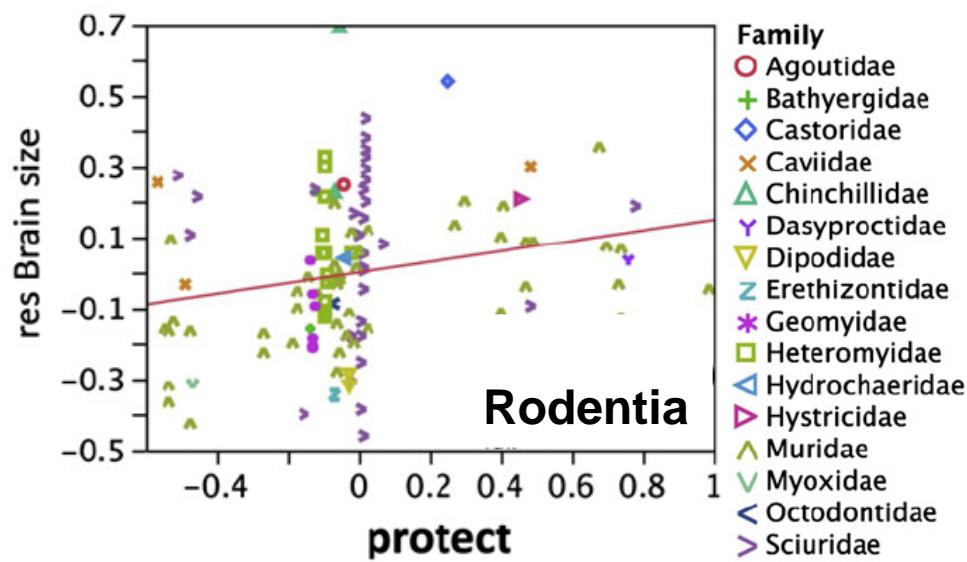
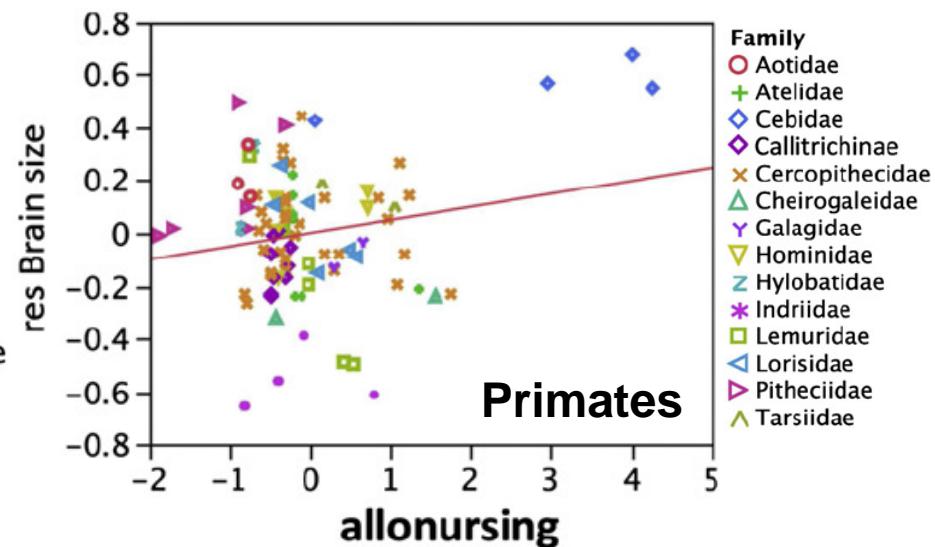
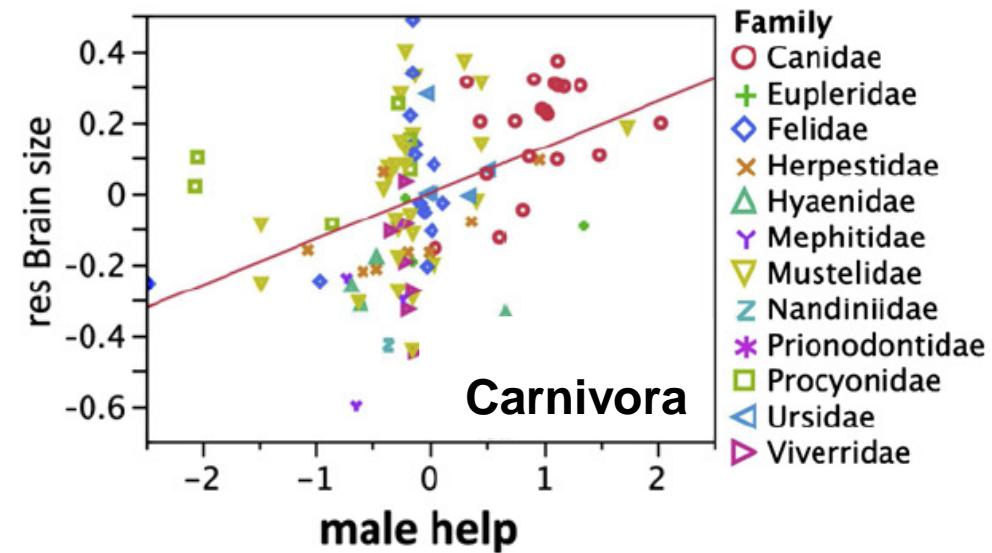
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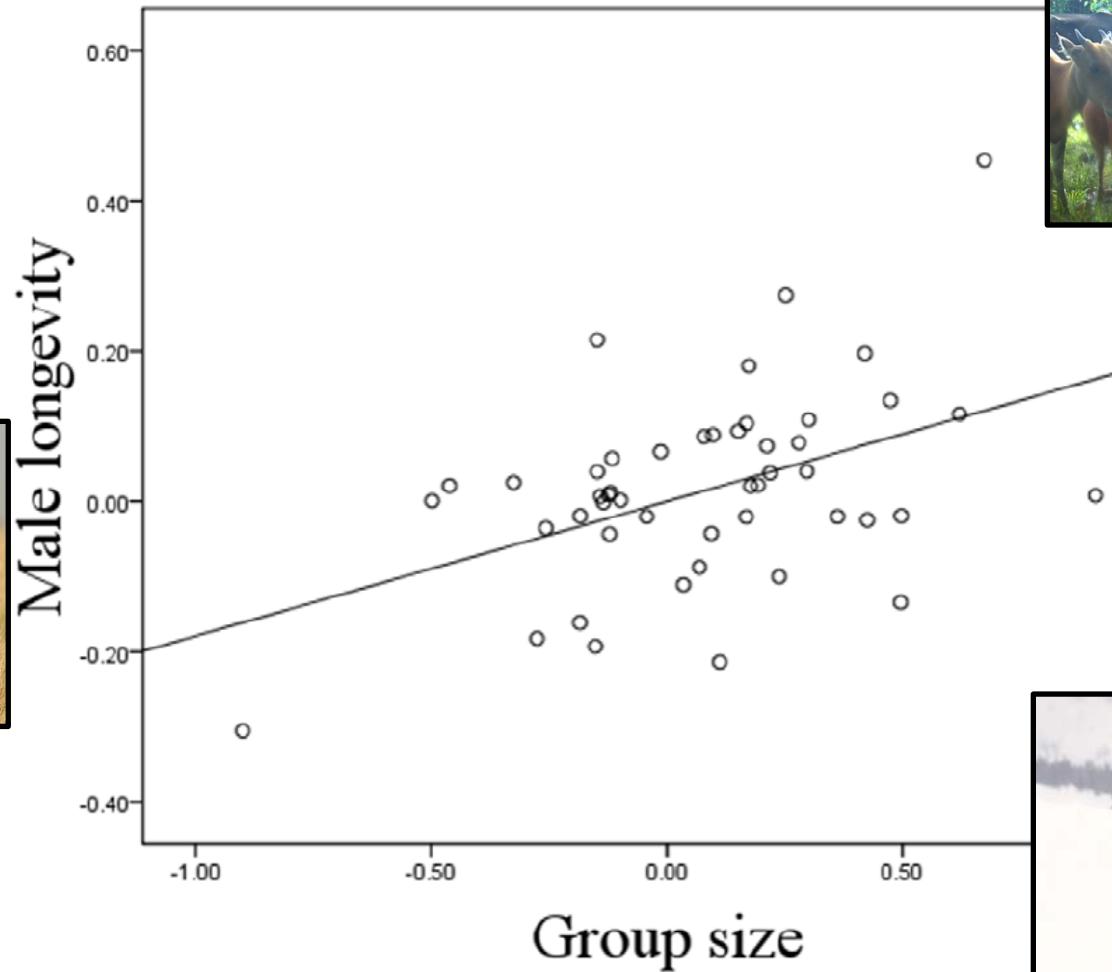
Brain size, allomaternal care, and longevity



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Brain size, anti-predator defense, and longevity



Brain size, social flexibility, and longevity

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

golden snub-nosed monkeys



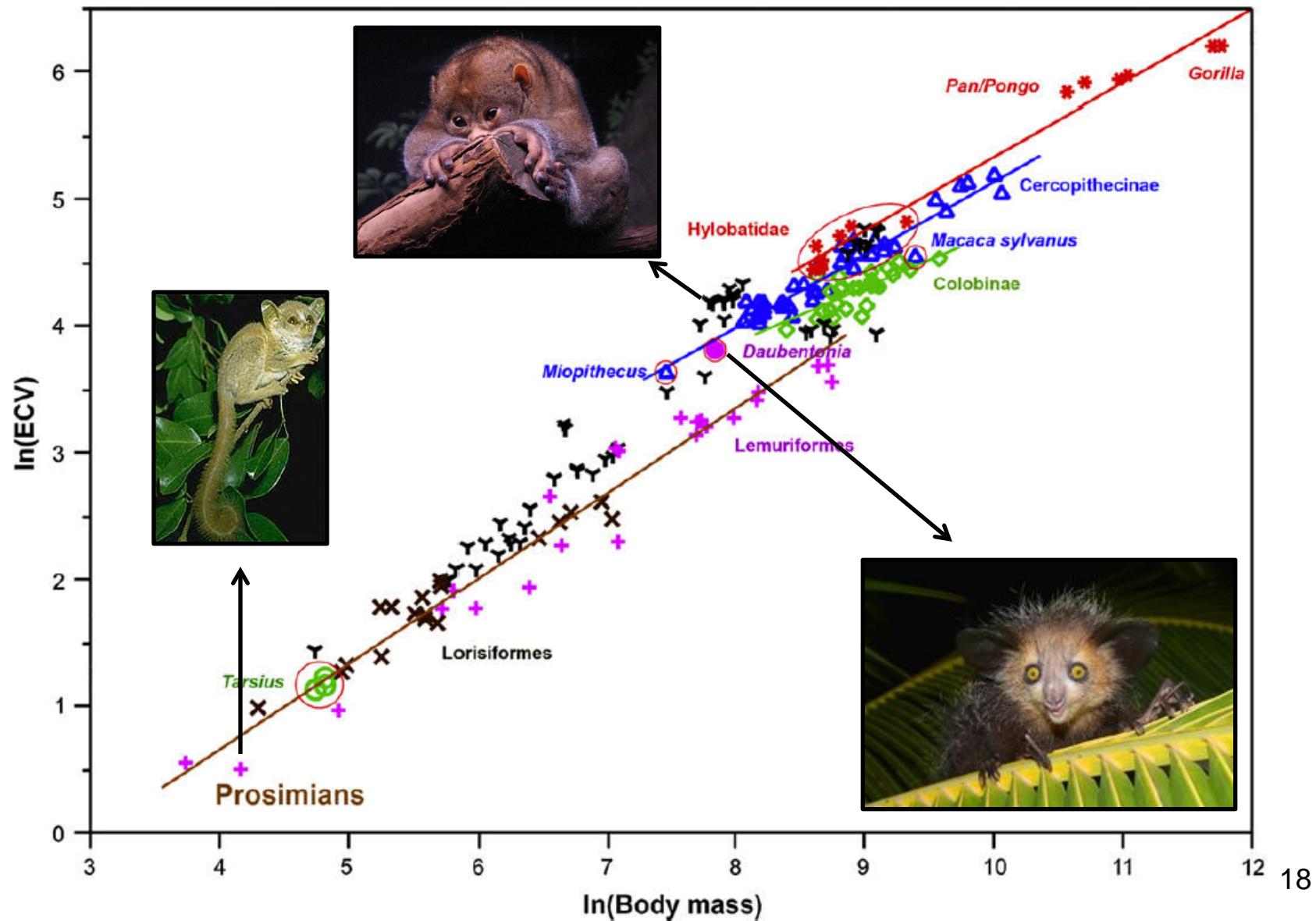
bonobos



Phillipine tarsiers



Brain size, social flexibility, and longevity



Brain size, social flexibility, and longevity

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

common chimpanzees with bush piglet



black and white ruffed lemur



Geoffrey's spider monkey



Leadership in mammals

- **leadership** = a non-random effect on group behavior of conspecifics through actions evolved or intended to elicit this effect, often through power.
- **power** = the ability of leaders to motivate followers to behave in ways they would otherwise not do, often through coercion.

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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?



Leadership in mammals

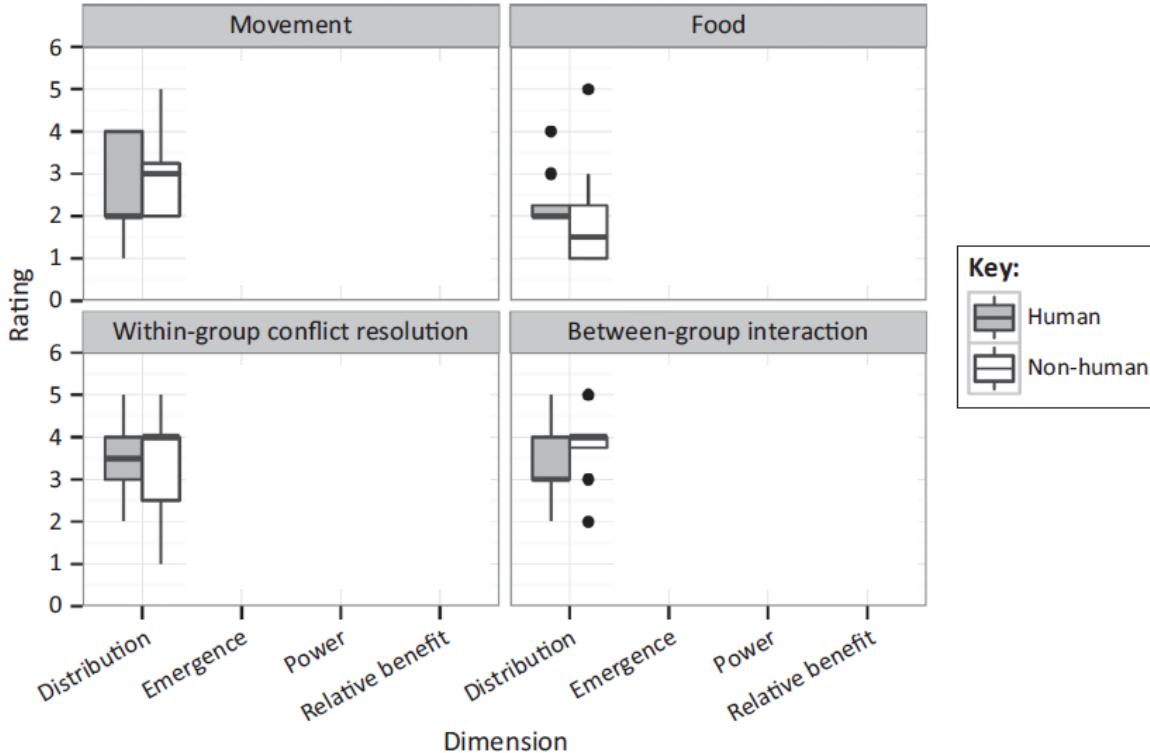
Distribution

- 1 = no leadership (all adults are autonomous in domain X)
- 2 = semi-autonomy: leadership in domain X is widely shared among a restricted age or sex category (e.g., females usually lead, older adults usually lead)
- 3 = moderately unshared (roughly the midpoint between 1 and 5)
- 4 = very unshared (a small number of adults lead in this domain)
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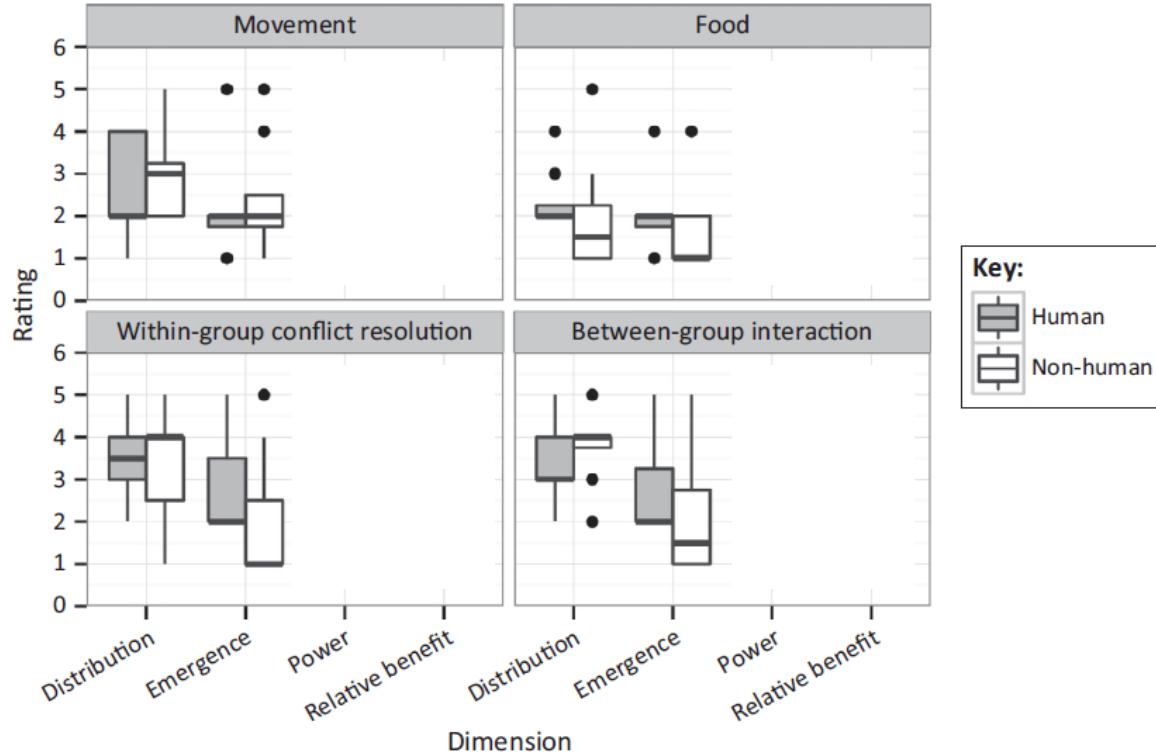
Emergence

- 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)
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Leadership in mammals

Relative benefit

n.a. = not applicable because no leadership (e.g., full autonomy)

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4 = leaders gain moderately relative to followers, on average

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