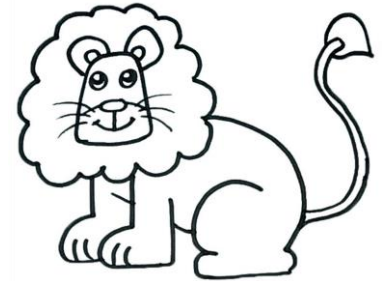




DEMOCRACY IN THE ANIMAL KINGDOM ?



DEMOCRACY IN OUR HUMAN SOCIETIES?



DEMOCRACY IN OUR HUMAN SOCIETIES?



Representative Republic

Elected officials who represent a group of people

Direct/pure democracy

People decide without any intermediary

LIVING IN A GROUP

- protection from predators
- information exchange
- defence of food / successful foraging



⇒ **Consensus:** all group members have to balance the advantages of insisting on their own personal preferences against the risk of the group splitting up

DEMOCRACY VS. DESPOTISM

- Democracy: Equal sharing of decision making with
 - A simple majority threshold
 - A sub-majority threshold
 - A super-majority threshold
- Despotism: Unshared decision making



DEMOCRATIC SYSTEMS: WHICH CONDITIONS?

- Group heterogeneity
- Group size \geq optimum
- Consensus costs vs grouping benefits
- Alternative decision outcomes vs potential consensus outcomes



⇒ equally shared decisions can evolve under a much wider variety of conditions than unshared decisions

A COMPLEX DEMOCRATIC SYSTEM

Linked to the social system ?



A COMPLEX DEMOCRATIC SYSTEM



Tonkean macaques

- Low symmetry of dominance
- Great tolerance between group members

Rhesus macaques

- Strictly hierarchical and nepotistic social system



A COMPLEX DEMOCRATIC SYSTEM



Tonkean macaques

= equally shared

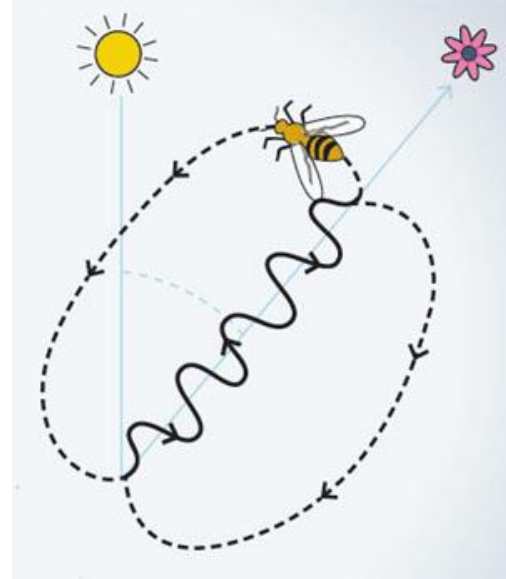
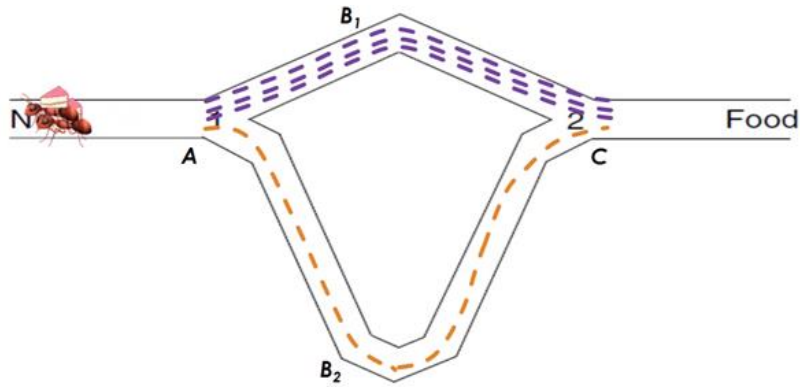
consensus de

Rhesus macaques

= partially shared consensus decisions

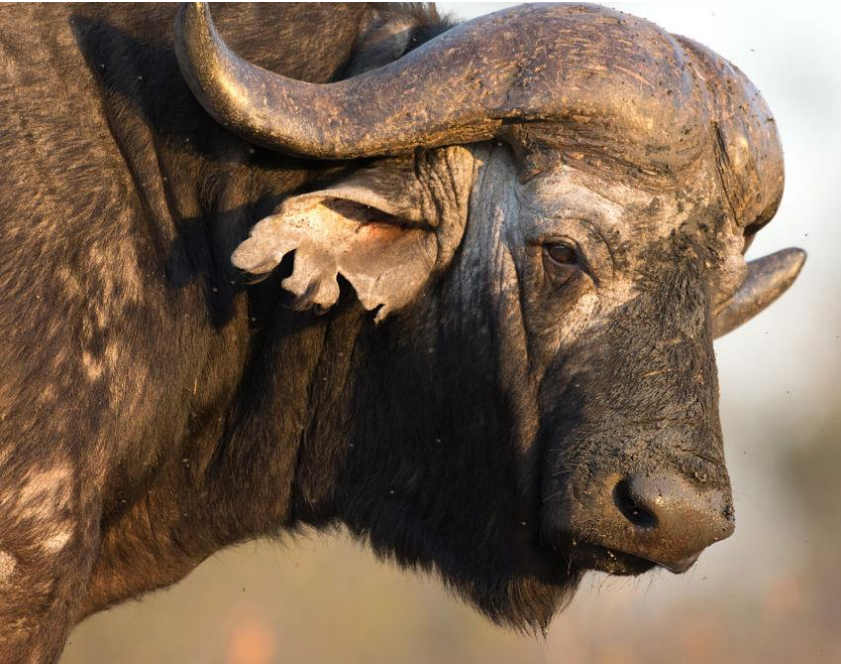


EUSOCIAL INSECTS: CHOOSING THE RIGHT NEST/PATH



Another kind of vote: weighted additive strategy

FEMALES AS THE MAIN VOTERS (CHEERS, ARISTOTLE!!)



African buffalos

When and where to move: Only adult females vote, regardless of their social status within the herd

Voting method: Follow my gaze!

FEMALES AS THE MAIN VOTERS (CHEERS, ARISTOTLE!!)

Chimpanzees

A leader can't rule without the agreement of females in the group

Voting method: Vocalisations



FLOCK VOTING: CHOOSING THE RIGHT DIRECTION

Pigeons

A dynamic, flexible segregation of individuals into leaders and followers

Even the lower-ranking members can make a contribution

Processing of social information



OTHER EXAMPLES

Species	Voting behaviour	Decision mechanism	N	Result
Red deer (<i>Cervus elaphus</i>)	Standing up	Majority of adults decides	10	Group moves when mean 62% (s.d. 8%) of adults stand up*
Gorilla (<i>Gorilla gorilla</i>)	Calling	Majority of adults decides	28	Group moves when median 65% (range 43–86%) of adults call ⁶
Guinea baboons (<i>Papio papio</i>)	Movements	Majority decides	–	Anecdotal report ⁶
Hamadryas baboons (<i>P. hamadryas</i>)	Movements	Majority decides	–	Anecdotal report ⁶
Howler monkeys (<i>Alouatta palliata</i>)	Movements	Majority decides	–	Anecdotal report ⁷
African elephant (<i>Loxodonta africanus</i>)	Low-frequency grumbles	Majority of adult females decides	–	Anecdotal report ⁸
Whooper swans (<i>Cygnus cygnus</i>)	Head movements	Intensity of signals reaches threshold	54	Group flies when signalling intensity ≥ 26.7 signals min^{-1} (ref. 9)
African buffalo (<i>Syncaerus caffer</i>)	Direction of gaze	Mean of votes of adult females	13	Average angular difference between mean gazing direction and group travel direction = 3° (range 0– 9°) ¹
Hamadryas baboons (<i>P. hamadryas</i>)	Position on resting rock	Majority of adult males decides	155	In 131 of 155 observations the travel direction equalled the majority vote ¹¹
Yellow baboons (<i>P. cynocephalus</i>)	Body orientation	Adults decide	–	Anecdotal report ¹⁰
White-faced capuchins (<i>Cebus capucinus</i>)	Calls	Direction changes continuously with each caller	–	Anecdotal report ¹²

