

Social group communication

1. Remember “group selection” aka evolution for “the good of the species”?

- The group selection fallacy suggests that behaviors, communication signals, etc., may evolve for the good of the species. This is *wrong*. What is true is that:
- *Individuals* (trout, algae, mayflies, zooplankton, cedars...) are selected to reproduce their genetic makeup as much as possible over their lifetime.
- Those genes that are passed on to the next generation in the greatest numbers are, by definition, the most successful. Individuals who do not reproduce are not (genetically) represented in the next generation. Evolutionarily, these individuals are dead-ends.
- To the extent that an individual's kin (siblings, cousins, etc.) share some of the genes as she does, she has a shared interest in them also being (reproductively) successful. But most individuals in a population are not closely related to one another. Given this,

Why live in groups?

If you live in a group, you need to be able to:

- Recognize group members
- Have signals that are used to maintain group cohesion.
- Furthermore, if your group is highly social, with complex interactions, you need to remember past interactions with group members

2. Recognition of members of your group: how do you know who's in, and who's not?

Mechanisms depend on

- size and stability of the group,
- whether or not group members are tied to a fixed site (e.g. a nest or territory), and
- how important it is to recognize individuals, versus classes of individuals (e.g. based on sex, age, or reproductive status).

Individual recognition mechanisms

Unpacking “familiarity”

“the monkey trying to groom me looks, smells, sounds, and acts like my friend Boris—must be Boris.”

- Looks like Boris: hue variations and contrasting patterns in coat or skin color; shape of facial features; scars, other evidence of past damage or experience.
- Smells like Boris: pheromones, other body scent (remember Napoleon's famous letter to Josephine?)
- Sounds like Boris: Frequency, temporal patterning
- Acts like Boris: Gait, posture, speed, affect

Also, the group must be relatively small and stable for “familiarity” to function well as a mechanism for recognizing individuals. In such situations, dominance hierarchies tend to develop, as individuals remember the outcomes of previous encounters with individuals (Did I win? Did he kick my ass? What did I say about his mother?)

Group recognition mechanisms

Subversion of the “familiarity” mechanism for group recognition: Slave-making ants get in to the nests of other ant species, and either steal the eggs and pupae, or replace the queen with their own, ultimately causing all members of the enslaved nest to do the work of the slave-makers. How do they accomplish this?

Phenotype matching in *Testudo Hermannii* (Hermann’s tortoises)

- In Hermann’s tortoises, both males and females can discriminate between their own species and others via olfactory cues, but only males can distinguish sex and sexual maturity of potential mates by olfactory cues.
- Sexual dimorphism in olfactory sensitivity may be a result of sexual selection, and suggests that males and females probably rely on different communication channels during social interactions.

Different groups (taxa, clades) tend to rely on different primary sensory modalities when using “familiarity” to recognize individuals.

- Fish: visual cues
- Birds and primates: visual and vocal
- Non-primate mammals: olfactory

Group permanence: fission-fusion groups

- Large groups of individuals that may sleep together, but break into several smaller groups during active periods, as to forage or groom one another. Fission-fusion groups are common in many primates (including humans), many mammalian carnivores (e.g. lions, hyenas), cetaceans (especially dolphins and orcas), and some fish.
- Recognition of group membership in a fission-fusion society must be multi-tiered, with more precise recognition of individuals in your small, stable sub-group, but still accurate recognition of all members of the large group.
- Both orcas (*Orcinus orca*) and parrots (*Amazona auropalliata*, above) develop vocal dialects that reveal group membership at multiple social levels.

3. Signals used to maintain group cohesion may be used for

- Appeasement
- Coordination of movements
- Worker organization in social insects

Appeasement signals are necessary to reduce aggression and maintain friendly relationships in stable, cooperative groups.

Allogrooming

- Reciprocal grooming between individuals, which results in cleaner (removal of insects, ectoparasites, leaves, etc) and more closely bonded individuals.
- Common in social animals that live in stable groups (primates, horses, cooperatively-breeding birds), but absent from flocking aggregations (less stable, more temporary associations).
- Tends to be directed to parts of the body that the recipient can't reach (back, neck).
- Subordinates who regularly groom dominants are more likely to get support from those dominants during conflicts (e.g. chimps, mangabeys).
- In horses, allogrooming of the neck and withers area reduces tension and heart rates in recipients.

Coordination of movements: Alarm calling

- See Hauser pp 413-433. He looks at functions, constraints, and specific alarm calls in birds, ground squirrels, and primates.
- "Coordination of movements" is just one possible benefit of alarm calls (see Hauser's table 6.2 for other functional hypotheses for the maintenance of alarm calls). These include:

Coordination of movements: Other group defense communication

Non-defensive group communication

- Female stingless bees come home after finding food, unload, and beep in loud pulses (beeps generated with intense, high-speed contractions of wing muscles). Vibration frequency communicates height of the food source: faster means higher (honeybees don't communicate height).
- Then: forager makes semicircular turns, beeping the whole time: beeps during turning correlate with distance.
- Direction appears to be communicated outside of the nest.
- Other bee dances: Honeybees: waggle dance. Bumblebees: primitive dance.

Chimps accept unfairness if they have close social ties to the beneficiary

- Chimpanzees will tolerate unfair treatment, as long as it benefits someone they know well.
- Captive chimps were given a piece of plastic, and rewarded for giving it back. If a subject is given a paltry payoff (e.g. cucumber slice or celery stick), and it can see another getting a grape, the short-changed ape may refuse to cooperate.
- But the strength of each chimpanzee's response depends on its social life. Those that had lived together for more than 30 years ignored the unequal treatment; whereas animals from a group formed 8 years ago reacted strongly.