

The Pros and Cons of Subordinance in Animals

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Topics:

- The Mystery of Subordination
- How Hierarchies are Made
- The Pros and Cons of Subordination
- Examples
- Strategies to Overcome Disadvantages
- Critique and Further Study



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Male rams fighting for a mating rights with a female

Subordination and Fitness

In many animal species with established social hierarchies, the alpha male and/or female are given many advantages and preferential treatment.

Some of these advantages are exclusive mating rights, first access to food, the best living arrangement and a leadership role in pack animals.

If this is the case, why would any animal ever accept being less than alpha if it seems to result in decreased fitness?

How Dominance Chains are Formed

Social hierarchies are formed through three mechanisms:

- Round Robin: One-on-one encounters with all/many of the other members in a group.
- Interpolation: Guessing one's rank after watching encounters between an individual it has fought and one it hasn't yet fought.
- Family Trees and Age: In general, the offspring of a dominant individual are expected to be dominant. Also, middle-aged members of a group usually dominate because they are more physically fit than the young and old.

Note how dominance can become a repeating cycle

The Cons of Subordination

In general, subordination can decrease fitness in three ways:

- Less opportunities to mate
 - Limited mating rights, must use clever strategies
- Less access to food and nutrients
 - Alphas get to eat first and eat more
- Lower chance of reproductive success
 - In African wild dogs, 76-81% of all litters are birthed by the dominant females

So it seems like subordinates don't have anything going for them...
Why don't they leave? Because a subordinate is less likely to survive on their own,
and also very unlikely to be high-ranking in another group

Example of Subordination Decreasing Fitness

Less access to food and nutrients - low-ranking toque macaques are kicked out of feeding areas by dominant males.

Less access to shelter - subordinate toque macaques are also displaced from communal sleeping grounds, which results in reduced growth and higher mortality rates.



Two female toque macaques with babies
Courtesy of [Ivan Teague](#) on Flickr. License CC BY-NC-SA.

This structure benefits the species - better genes are passed on. However, dominance is never perfect, and other individuals want to pass on their genes too, so that's why the disparity is created. Animals must find clever ways to mate while avoiding the dominant male/female in controlling species.

The Pros of Subordinance

However, subordinance can also increase fitness through:

- Decreasing the probability of injury sustained during interspecies conflict
 - Conflicts become less severe
- Reducing the number of conflicts
 - Both because conflicts are settled very quickly when social rank is predetermined, and because most challenges are directed at the alpha male or female
- Reducing stress and testosterone levels
 - Alphas and omegas have been shown to have the highest levels of glucocorticoids and testosterone

High levels of glucocorticoids (stress hormones) and testosterone decrease fitness because they have an immunosuppressive effect

In hens, less conflicts happen due to the established pecking order. Because of this, more resources can be dedicated to egg-laying. Less conflicts also means less stress and injuries, so the probability of healthy offspring is higher.

Examples of Subordination Increasing Fitness

Decreased response to stress -
in mice, dominant males show a stronger stress response than subordinate males when exposed to the same stimuli

Decreased energy expenditure -
in pied flycatchers the alpha males have the highest RMR, and as a result they physically deteriorate, causing them to lose body mass and rank.



European pied flycatcher

Courtesy of [Stefan Berndtsson](#) on Flickr. License CC BY.

In general, you should always define abbreviations the first time you use them.

The alpha position is only good for short periods of time - eventually age, stress, and high energy expenditure catch up and a replacement is brought in. Kind of surprising that you get the position because of physical superiority, and then lose it because of the high demands.

Examples of Subordination Increasing Fitness

In some animal groups such as baboons, the beta males may actually have the highest fitness. This is because they don't encounter the same stresses as the alphas and omegas, but still retain some amount of mating, feeding, and housing benefits.



A male baboon
Courtesy of [Jim Bowen](#) on Flickr. License CC BY.

Taking a cut on stress has a much bigger effect on increasing fitness than increasing the number of mating opportunities

Is this always true? How much evidence is there that it is true?

Strategies to Overcome Disadvantages

- Challenging the Alpha: In some species, like the bighorn sheep, the challenger can win. Another method employed by baboons is to form an alliance of low-ranking members and get access to females by overwhelming the alpha.
- Female Mimicry: Young and subordinate flat lizard males mate by mimicking females to get close to the dominant male's posse of females, and then quickly mate and get away.
- Deception of Females: Subordinate burying beetles mate by luring females away from the dominant male with pheromones and then sneakily copulating before the alpha male can chase them away.

I couldn't find much on how subordinates overcome nutritional disadvantages.

Critique and an Idea for Future Study

- Overall, the studies I read were very general and relative when discussing social rank. The vast majority only had two categories - “dominant” or “submissive/subordinate.” I think there should be more differentiation between rank because it might yield different results. For example, there could be a significant difference in outcome of a conflict between an alpha male and an omega male versus two mid-rank males.
- Therefore, I think a good future direction of study could look at the outcome of a conflict between two members of a species as a function of their difference in rank.

Questions?



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Sources

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19

20% Relevance to class: Cite specific ideas or principles of ethology and sociobiology

. Relevance is clear. Discussion centered on fitness issues (sociobiology)

.

20% Sources: search effort, reading effort, adequacy for the report and accuracy of

19

. understanding

. Extensive enough in the time available. Fairly good understanding.

.

20% Organization of ideas with helpful use of headings; clarity of descriptions

19

. Organization made the coverage clear. Helpful to audience.

.

20% Examples used to explain the topic clearly and effectively; interest shown by student

.and generated in audience

20

. Insertion of examples after making a general point was very good.

.

20% Critique of studies read and future directions (your ideas about relevant work you think

18

. should be done if you were working in this field).

. Your ideas are good. I am surprised you did not find more on conflict in middle ranks, etc.

. We mentioned this in class when discussing jackdaws. However, the basic point is probably

. correct. Other suggestions about work in this field could be made. Also, some critique of studies.

95/100

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