

Assignment: Hypothesis Development Paper

Content:

For one of the behaviors described below, complete the following assignment:

1) Write four alternative hypotheses to explain the behavior at the effects on fitness level of analysis (i.e., selective consequences or function)

- Tip: Clearly state the hypothesis in one or two sentences, then write a brief discussion of the logic of the hypothesis. In particular, make sure that you clearly explain how the behavior increases the fitness of the individual who shows it. Included in this should be an explanation of any (reasonable) assumptions necessary to make the hypothesis logical. Make sure that it is easy for a reader to identify your assumptions.
- Tip: Your hypothesis should be logical and should not seem unlikely based on the natural history information you have available. It should be able to explain the observations that are described.

2) For each hypothesis, generate four predictions. Requirements:

- Predictions must be specific enough to be (potentially) testable.
- You must include and identify at least one critical prediction for each hypothesis. Critical predictions, if refuted, would refute the hypothesis from which they arise.

3) Choose two predictions from each of two hypotheses and describe an experiment to test the prediction (thus you will have a total of 4 tests). Tests can be observational or experimental, but must address the key points of your prediction.

Organization:

Type and double-space your paper, minimum font size 12 pt, maximum length = 5 single-sided pages.

Write the paper in outline form (i.e., use headings and group the predictions and tests below the relevant hypothesis. e.g., Hypothesis #1, Predictions of Hyp. #1, Tests of Hyp. #1, etc.).

Write in complete, logical sentences that provide sufficient explanation of hypotheses, predictions, and tests such that your peer reviewer or I can follow your logic. Be sure to clearly label your hypotheses, predictions, and tests.

Behaviors:

1) Web reduction in male redback spiders

Sexual cannibalism, the consumption of the male by the female during copulation, occurs frequently in the Australian redback spider (*Latrodectus hasselti*). Male redbacks search the environment for female webs, and may be attracted to the webs of females by chemical cues. When a male contacts the web of a female, he usually commences courtship immediately and continues to court for 2 to 8 hours. Courtship includes a long period of web activity during which males produce vibrational signals. Although females are typically very aggressive, they usually remain stationary in the web during much of the male's courtship and during copulation. Females have the opportunity to mate with several males in their lifetimes-- a number of males may arrive at her web, one by one, over the course of a few weeks.

A puzzling behavior is performed by some males while they are courting. These males will spend a large proportion of their time cutting pieces of the female's web and rolling it into a ball-like or rope-like structure. They then cover the balled-up female webbing with threads they produce themselves. After several hours of this, the number of support threads in the web (which is a "cob-web") is often reduced by 50% or more. Females will sometimes move about during courtship to repair the web if it has been substantially altered by the male. Web reduction is seen only periodically in the field (males only perform this behavior on the webs of virgin females), but it occurs with very high frequency in the laboratory, where males and females are reared in isolation.

At the 'effects on fitness' level of analysis, why might male redbacks perform web reduction?

2) 'Anting' in African tachinid flies

Tachinid flies resemble house flies, and most species are parasitoids of other insects. Brown house ants are small (2mm long) insects, which primarily feed on detritus and plant debris. They form long feeding trails between a food source and their nest. In these trails, ants follow each other and (presumably) a pheromone to a food source, pick up a piece of food, and then carry it back to the nest.

A species of African tachinid fly performs an unusual behavior with these foraging ants. The flies position themselves within or just to one side of the ant trails. Every 20 seconds or so a fly will reach into the trail and grasp an ant in its mouthparts while fanning its wings. The fly then makes a small backwards leap while still holding the ant in its mouthparts. During the backwards hop (while still in mid-air) or immediately upon landing, the fly releases the ant, and the ant rejoins the trail. The fly then repositions itself beside the trail and repeats the behavior; it may continue to do so for up to 30 minutes. The ants that are targeted by the flies are ones that are NOT carrying food.

At the 'effects on fitness' level of analysis, why might the tachinid flies perform this behavior?

3) Bowing display in cowbirds

Cowbirds are obligate brood parasites whose females lay their eggs in the nest of birds of other species and do not themselves care for their young. Therefore, young cowbirds probably do not receive much contact with conspecifics until they leave the nest. Nevertheless, juvenile cowbirds seem to realize their identity and, after fledging, join flocks of other juvenile cowbirds and engage in normal cowbird behavior. Adult cowbirds are territorial in the mornings but then join large social groups composed of adults and juveniles in the afternoons to forage.

Cowbirds have a curious bowing display which they sometimes perform when interacting with other cowbirds. Sometimes one bird will move towards a nearby bird until it is in very close proximity. It will then bow its head in the direction of the other bird and remain with its head bent for several minutes. The response to a bow is usually one of the following: (1) the bird who is the object of the bow will peck the bowing bird on the head, sometimes several times, (2) the bird who is the object of the bow will return the bow, (3) the bird who is the object of the bow will return the bow, then peck the other bird on the head, or (4) the bird who is the object of the bow will fly away or will remain still and not respond to the bow. Female cowbirds show the bow display to males, to other females, to juveniles, and sometimes to heterospecifics. In comparison, males bow to females, but do not bow to each other. It is not known whether males will bow to juveniles. Juveniles usually initially respond to bowing with a peck-only response, but after being exposed to the display several times, they begin to return the bow in response.

At the 'effects on fitness' level of analysis why might cowbirds engage in the bowing display?