

Commentary

Wildlife habituation: advances in understanding and management application

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DELIBERATE HABITUATION of wildlife to humans, while enormously useful and at times indispensable, is a double-edged sword. It may lead to a rich harvest in scientific knowledge, but it is also a source of mortal danger to wildlife practitioners, to the animals, and to hapless third parties. Inadvertent habituation, in which wildlife accepts or seeks out the presence of humans in order to benefit from food, shelter, and security, entails risks and generates management and public relations problems for public agencies. Negative habituation, in which systematic human activities lead to avoidance of humans by wildlife, also has costs, such as the loss of wildlife populations via alienation; its benefits include the systematic avoidance of humans by predators.

Habituation has non-trivial ramifications for the safety of the observer, visitors who are naïve about habituated or tame wildlife, and for the animals being studied. Habituation can lead to attacks on humans, leading ultimately to the demise of the habituated animals. These are ongoing concerns when supervising graduate students in the field, for habituated animals will signal attacks, and the observer must be able to interpret such signals correctly. Failure to do so can lead to injury and death. Habituation and its ramifications are, therefore, almost constantly on one's mind when doing field observations.

The demise of Timothy Treadwell and his girl friend Amie Huguenard was predictable. Treadwell was an amateur naturalist who lived among the grizzlies for 13 summers in Katmai National Park, Alaska. In October 2002, grizzly bears that the couple had habituated killed and ate them (Medred 2003). Unfortunately, there are other cases with similar endings; however, these failed to receive the same ghoulish public attention as Treadwell's demise, primarily because the victims were not guilty of the misleading messages and self-promotion typical of Treadwell at the expense of hapless

bears. We now have reasons to suspect that Treadwell lasted as long as he did in part because carnivores are more timid and, thus, less likely to attack than ungulates.

However, not every animal that tolerates humans is habituated. Some may already be "tame," that is, engaged in predictable, voluntary, and reciprocal interactions with humans. Other animals may have had negative experiences with humans at close range and tolerate them only at a distance before moving off. Some animals may tolerate humans due to a maternal tradition. There is no way to tell *a priori* why an animal tolerates humans. Tame and negatively-conditioned animals are usually not very dangerous. Unfortunately, habituated animals are potentially dangerous because habituation is a state of unconsummated interest on the part of the animal, expressing itself as tolerance of humans. One discovers this through systematic habituation and taming.

Negative conditioning, population decimation, and conservation actions

Negative conditioning is the flip side of the coin to habituation and taming. Disturbance is so potent that it can lead inadvertently or deliberately to the destruction of animal populations by making the affected animals avoid large areas of their habitat. Following are 2 examples that also show how we have long ago comprehended power of behavioral manipulation.

In a study in New Zealand by Dr. Les Batcheler (1968), negative conditioning was used experimentally to destroy a deer population. Batcheler's experiment aimed to alienate red deer (*Cervus elaphus*) from valuable forests in order to reduce forest damage. His chosen noxious stimulus was stalking. However, he limited stalking to high-quality habitats. This made surviving deer shift to low-quality

habitats. Subsequently, the deer shrank in body size, suffered reduced reproduction, declined in numbers, and stayed faithful to the poor habitat for some years without recolonizing the good habitat.

In the second example, observations of mountain sheep led to the conclusion that each population's home range was maintained as living tradition passed on from generation to generation (Geist 1967). Consequently, harassment could alienate sheep permanently from crucial habitat. We suspected that populations were lost because of this, leaving a large areas of empty sheep habitat. An aggressive policy of reintroduction was the logical antidote to such losses due to negative conditioning (Geist 1975). This was actualized, resulting in a 50% increase in numbers of mountain sheep (Toweill and Geist 1999).

I have noticed that bear biologists concerned with habituation appear not to be aware of the consummation of habituation, that is, the predictable exploration terminating habituation. They are, however, well aware of negative conditioning (Herrero et al. 2005). I would suggest that an exploration response by a habituated bear, in contrast to a habituated mountain sheep, could be lethal to the observer. In practice one must, therefore, assume that all animals tolerating humans are merely habituated and thus be on guard! The above model is universal and applicable to some serious habituation problems with large carnivores, as illustrated below. Why habituation is a state of danger requires some exploration of the psychology of habituation

Theoretical basis for habituation

A fundamental characteristic of all living beings is to search for predictable conditions. It allows the organism to live at the lowest maintenance costs, conserving a maximum of energy and nutrients for reproduction. This goes back to elementary bioenergetics, which shows that food is costly to procure, is digested inefficiently, and is metabolized even more inefficiently into work. To minimize maintenance costs, an animal must, consequently, live in surroundings it is familiar with so that it can reduce travel, running, climbing, excitement, or costly interactions with conspecifics (see

Geist 1978). The requirement for predictability generates the Law of Least Effort, or Zipf's Law (Zipf 1949).

Zipf's Law interacts with another fundamental law governing all life, namely that of maintaining security. The animal must act so as to protect itself against predators, parasites, pathogens, and any breakdown of the body. Because security has priority over other life strategies, security adaptations can even segregate sympatric species ecologically, as found in the deer family (Geist 1998). However, individuals must have mechanisms of exploration that allow them to create a predictable environment at a reasonable cost. Animals cannot, for instance, run from any potential danger, as this would increase the cost of living and, thus, reduce reproduction. Consequently, animals must explore potential danger so as to minimize the high cost of escaping, be the costs direct, such as the high costs of running and climbing, or indirect, such as vacating good feeding areas for secure escape terrain or replacing feeding time with time being alert and watching. This latter is incompatible with maximizing energy and nutrients toward reproduction. Consequently, all organisms have ongoing, sophisticated ways of exploring their environments and making them predictable, physically and socially (Geist 1978).

Danger signals

To stay out of harm's way, it is imperative that the observer be able to read the silent signals of the habituated species and avoid the animal in time, never allowing it to approach the observer. What danger signals must the observer look for in habituated or tame animals? In predators, it is a noticeable attention to and following the observer. I personally have experienced such near my home on Vancouver Island where wolves began following riders and confronting but not attacking them. Such visual investigations are most likely the prelude to predatory attacks.

Observers approaching wildlife deliberately and brazenly may see some behaviors that the encroached animals manifest to deter the observer from coming closer. Herrero et al. (2005) published a detailed list of signals denoting anxiety or threat from bears approached by

humans. The authors, commendably, drew attention to the likelihood that an animal is likely to exhibit internal stress reactions well before it shows such in its overt behavior. They also suggested relabeling "individual distance", "personal space", or "critical distance", to "overt reaction distance" to keep in mind the hidden cost of excitement to the approached animal that sets in well before an overt behavioral response become obvious.

Dominance displays

In both ungulates and bears, the most important signal to watch for is the dominance display. Unfortunately, most humans have a very difficult time recognizing this signal at all, let alone recognizing it as a signal of high danger. A grizzly bear or mountain goat in a dominance display intended for humans looks away. Their intentions, thus, are concealed from us to the point of going unrecognized as communication, and least of all as challenges or threats to us. We have to learn that the usual dominance display of larger terrestrial mammals, primates excluded, is a broadside display with eyes averted. In dominance displays, various attention-getting mechanisms are used to arrest the onlooker's attention to the broadside picture plane that puts emphasis on size and mass of the displayer (Geist 1978). In addition, the relaxed normal motions of everyday life are usually replaced by slower, stiffer motions. During the display, the head of the displayer is averted and its object is viewed through the rear of the eye. The displayer does not approach directly, but at a tangent; that is, it circles onto the object of display. The human observer normally interprets such a scenario as an animal walking slowly past and not paying any attention to the observer. The attack comes suddenly from the dominance display. It may be triggered by the human observer losing interest and looking away. I have never permitted myself to lose eye contact when close to a potentially dangerous large mammal.

There are exceptions to the body display, as the dominance display may focus on horns, as it does in bighorns, so that the displaying ram turns and twists its horns to show them off to an opponent or to a prospective mate (Geist 1971). The subordinate-to-be may counter display, and close the eye toward the displayer.

Dominance displays are discussed in detail and in context by F. Walther (1984).

I am aware of several captive and free-roaming ungulate attacks on humans, one of them fatal and two nearly fatal. The victims had in common a lapse of attention, a condition that apparently triggered the attacks. The lapse in attention was due to judgments that no immediate danger existed. In each case, the evidence or the words of the observer indicated that they saw, but did not recognize, the danger from the species as dominance displays. Something similar happened to me while I worked in zoos. By demonstratively looking away from captive male deer as I stood behind good fences, I was able, repeatedly, to trigger attacks. I am aware that in dominance fights between mountain sheep males, the attacking ram's feeding bouts, during which it watched the defending ram, appeared to be a deception to throw the defender off guard. If successful, the attacker would be able to hit the defender before the latter was fully prepared to counter and neutralize the clash (Geist 1971).

In short, when large mammals show an interest in the observer, or perform the first, faint dominance displays, it is high time for the observer to leave. This must, of course, not be done by a direct retreat, or worse still at a run, but by fainting indifference and retreat, placing trees, stumps, or big rocks between the animal and the observer.

Brazeness on the part of the observer is an excellent deterrent to such inquisitions or attacks. Fearfulness or timidity, on the other hand, can trigger attacks! Every animal we observe at close range also observes us, and wolves and bears may even follow one's tracks and sit close to one's cabin, apparently listening to what goes on inside. Unfortunately, it often is true that "familiarity breeds contempt," and it can become an inducement for an animal to attack a human observer. In short, the observed animal after habituation and taming, can, through continuous observation of the observer, be induced into an attack.

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