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NEWSLETTER

Featuring updates on grizzly bear conservation activities, and the latest *Grizzly Times* Blog and Podcast from *Louisa Willcox and David Mattson, PhD.* Co-Founders of *Grizzly Times.*

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October 2, 2021

Dear Friend of the Grizzly,

We thought you would be interested in David Mattson's latest technical report, hot off the press: *Teaching Bears: Complexities and Contingencies of Deterrence and Aversive Conditioning*. The Executive Summary follows these introductory paragraphs.

David's investigations were inspired by a recent campaign by US Fish and Wildlife Service (FWS) to haze Felicia (aka #863), one of Jackson Hole's celebrity grizzlies, from along roadsides she has frequented over Togwottee Pass for several years. Beginning last spring and continuing to this day FWS officials have been systematically shooting projectiles at Felicia and other grizzlies in Grand Teton and Yellowstone in an effort to get them to stay away from roads, claiming that the effort is based on sound science.

In response to this claim, David has done what he always does: unearth every bit of research and literature available and then summarize it in a comprehensive, yet readable report. His report focuses research with grizzly, black and polar bears. Managers, scientists, and environmentalists interested in the conservation and well-being of bears would benefit from reading this summary of knowledge about hazing and aversive conditioning that is the first and only of its kind.

The topic is broad, sprawling and exceedingly complex, involving how bears learn and what motivates them, including factors that have nothing to do with humans — such as the presence of other bears. Furthermore, the research done so far has been extremely limited in scope, using a wide range of methods and standards of evaluation. As a bottom line, we should approach hazing and aversive conditioning with a great deal of humility and caution.

Still the research points to several conclusions. First, hazed bears were unlikely to avoid human environs for long periods of times, especially if human-associated attractants remained available.

Second, bears that have learned to be tolerant of humans, with heightened needs for food and security, such as females with cubs (aka Felicia, and other roadside females such as 399 and 610) in areas with high densities of other adult bears concentrated in the backcountry, will be least likely to translate hazing experiences into generalized avoidance of humans and human infrastructure.

By contrast, bears that are inexperienced with humans or human-associated foods, with minimal security concerns, and with foraging opportunities in the backcountry, such as naïve adult male bears, will likely respond best to hazing, if well executed.

But importantly, hazing can cause unintended consequences for bears and people. If sustained to the point where a bear experiences acute distress or even trauma, relentless punishment can impede learning processes, making bears potentially more anxious, aggressive, or even helpless and unable to respond at all.

Photo by Tom Mangelsen.

The takeaway is this: **The role of aversive conditioning in managing human-bear conflicts is quite limited, in contrast to efforts focused on people. At best, hazing might help managers buy time to address the human roots of the problem, such as the availability of attractants or problematic behaviors of people.**

We hope that this report will help shape a healthy and constructive discussion about the role of hazing in the context of other, potentially more effective approaches that focus on managing people. We understand the anxiety of managers faced with the popularity of celebrity grizzlies, such as those living in Jackson Hole, and the mounting throngs of people seeking a glimpse of them. But in the long run, expanding and improving programs to manage the behavior of people around bears will likely yield the best results, while inflicting less pain on our bears.

For the bears,
David and Louisa

Teaching Bears: Complexities and Contingencies of Deterrence and Aversive Conditioning

Introduction

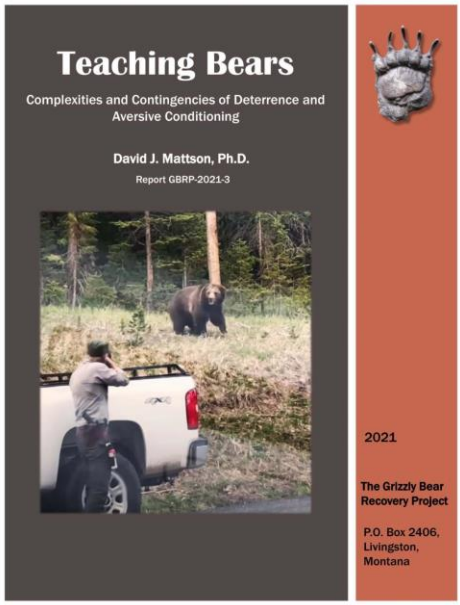
Managers are increasingly using non-lethal methods to resolve human-bear conflicts — largely because the public is demanding that wildlife be treated more humanely and with greater regard for their intrinsic value. Hazing or a fixed infrastructure designed to inflict pain and discomfort are the most common non-lethal means employed by managers to drive bears away from people and human facilities or, even more ambitiously, teach them to indefinitely avoid roads, residences, and campgrounds.

The 2021 technical report entitled *Teaching Bears: Complexities and Contingencies of Deterrence and Aversive Conditioning* focuses not only on the uses of deterrents to haze bears away from conflict situations, but also, more importantly, on the complexities that bedevil efforts to educate wild bears under field conditions. Aversive conditioning — a general term for pain-based fear-instilling learning processes — is probably the most complex endeavor that a manager can undertake with a bear. *Teaching Bears* delves into the many facets of aversive conditioning, including terminology and concepts relevant to understanding the basics of how animals learn about their world.

However, most of this report is devoted to describing what it is that individual animals bring to a learning process, and how these internal complexities along with the particulars of a given context largely dictate whether efforts by managers to deter and aversively-condition bears are likely to be successful or not.

The report concludes that **aversive conditioning will almost invariably have a limited role in non-lethal management of human-bear conflicts, especially in contrast to efforts focused on people. At its most useful, hazing can be used to temporarily drive bears away from a conflict situation, providing a respite during which managers can then address human-related elements such as the availability of attractants or problematic behaviors of people.**

The report can be downloaded either by clicking on the image below or the highlighted text here. The report's Executive Summary is immediately below:



Executive Summary

During the last 40 years researchers and managers have increasingly deployed non-lethal methods to address conflicts between humans and bears,

largely in response to mounting public demands for more humane treatment of wildlife. These non-lethal methods can be arrayed along a gradient characterized by the urgency of a conflict situation and the goals of involved people. During a bear attack, repelling the involved animal is paramount. Deterrence is more salient when people want a bear to leave a specific situation or even, more ambitiously, exhibit subsequent short-term avoidance. Aversive conditioning — also known as fear conditioning — is typically undertaken by wildlife managers with the intent of teaching a bear to avoid a broader spectrum of circumstances for longer periods of time. The delivery of painful or otherwise discomfiting stimuli is integral to all of these interventions.

Handheld devices that deliver capsaicin spray, non-lethal projectiles, or cracker shells are typically used as repellents. These devices, along with trained dogs and aversive capture procedures, are characteristically deployed during hazing operations designed to both deter as well as aversively condition bears. Hazing and static mechanical devices such as electric fencing are both used in conditioning or deterrence, but with the former typified by the active real-time involvement of people and the latter by fixed devices that can function without people being present.

Conditioning almost invariably involves either sensitization or desensitization of an animal to specific ensembles of stimuli and cues, with the former typified by the direct triggering of somatic and emotional experiences, and the latter usually entailing cognitive processes that imbue more abstract representations of sensory experiences with the qualities of stimuli. These processes are intrinsically associative, in the sense that an animal learns to associate certain sights, sounds, and smells that are not explicitly painful or pleasurable with stimuli that are. This kind of learning is facilitated by the close juxtaposition of stimuli and cues in time and space, and also by moderately painful or pleasurable stimuli delivered at intermediate absolute frequencies.

Extremely painful stimuli can produce immediate effects, such as the departure of a bear from a conflict situation. However, if sustained to the point where a bear experiences acute distress or even trauma, relentless punishment can impede associative learning processes, and even produce the phenomenon of “learned helplessness.”

Conditioning and the entailed learning can either be positive, negative, or extinctive. Positive conditioning is also known as “appetitive,” and is commonly associated by bear managers with the phenomenon of bears learning to exploit human-associated foods: i.e., “food-conditioning.” Negative conditioning is commonly referred to as aversive conditioning; when meted out by humans, often with the intent of teaching bears to avoid all humans and human facilities.

However, this outcome depends on bears generalizing discomfiting experiences associated with a specific context to a broad range of more abstract situations or features that we humans think of as residences, campgrounds, or highways.

Conversely, an ability to discriminate and mentally map cause and effect at a fine-grain (i.e., “tuning”) can lead a bear to merely avoid specific situations or even specific people. Extinctive conditioning entails desensitization to certain ensembles of cues as a result of experiences that don’t entail either painful or pleasurable reinforcements. This waning of reactivity is commonly referred to by bear managers as “habituation,” usually in reference to the emergence of a bear’s tolerance for humans.

Felicia doing yoga. Photo by Ann Smith.

Bears targeted for deterrence or aversive conditioning by bear managers are almost invariably subject to numerous incentives and disincentives that have little to do directly with humans, but are, rather, associated with conspecifics, foods, ambient conditions, internal imperatives, and past conditioning related to non-human factors. Most bears are motivated to avoid adult males because of the physical threat they pose, often manifest in the form of infanticide and even cannibalism. Adult males are capable of killing cubs as a presumed means of increasing their odds of mating with unincumbered females and, in the process, alleviating some of the intense competition with other males for reproductive opportunities.

Adult females accompanied by offspring are thus highly motivated to avoid potentially infanticidal males. But they also operate under energetic exigencies unlike those of other bears. Reproductive-aged females not only need to sustain dependent young through gestation and lactation, but also endure the energetic costs of lost foraging opportunities entailed by the pursuit of security. Perhaps paradoxically, humans can create an ideal niche for adult female

bears if there are unexploited foods in human environs, adult males are disproportionately concentrated in the backcountry, and interactions with people are consistently benign. The result can be a female bear that is highly tolerant of people and highly motivated to use human environs both as a means of accessing much-needed food and providing much-needed security for offspring.

Information from laboratory studies, research involving other animals, and ecological studies of bears offers a robust basis for informed predictions about constellations of factors that make deterring and aversively conditioning bears more or less likely to succeed. Bears that have learned to be tolerant of humans, with heightened needs for food and security from conspecifics (e.g., habituated adult females with cubs), and in areas with high densities of other adult bears differentially concentrated in the backcountry will be least likely to translate hazing experiences into generalized avoidance of humans and human infrastructure, especially if aversive conditioning efforts are poorly planned and executed. By contrast, bears that are inexperienced with humans or human-associated foods, with minimal security concerns, and with prerogative on foraging opportunities in the backcountry (e.g., naïve adult male bears) will likely respond best to hazing, especially if done well by managers.

Unfortunately, research done specifically with bears offers little basis for either confirming or disconfirming these sorts of predictions, largely because of limited scope, a wide range of methods and evaluative standards, and the extent to which methods, contexts, and standards are consistently underspecified in published reports. Most bears targeted during these studies were apparently young males, although females were well represented in a few studies. Adult males were virtually never targeted, probably because they rarely offered themselves as targets.

Promisingly, most bears departed a location after being hazed and rarely returned within the next 24 hours, creating an opportunity for managers to address human-related features of a conflict situation. However, the main conclusion of most researchers was that hazed bears were unlikely to avoid human environs for longer periods of times, especially if human-associated attractants remained available.

In contrast to this equivocal, if not pessimistic, conclusion regarding prospects for aversive conditioning, there is ample evidence supporting the efficacy of managing people and human-associated attractants to prevent and resolve conflicts with bears. In the balance, if coexistence of humans and bears is indeed the over-arching goal, hazing and aversive conditioning will invariably

be a minor feature of management necessarily focused on engaging with and managing people.

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We need your help! We have retired and are doing this full-time work pretty much gratis – despite the gradual dissolution of our physical bodies.

If you were following the delisting court case, you know that David's role was vital to the litigation success that restored Endangered Species Act protections to Greater Yellowstone's grizzly bears. The skilled attorneys could not have won the case without David's scientific expertise. He also helped with the successful appeal to the Ninth Circuit Court, which has implications for delisting of Northern Continental Divide grizzlies, and perhaps all grizzlies in the lower 48 states.

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