



Using Enrichment to Problem-Solve Stereotypies in Bears

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Many of us have worked with a pacing bear. Watching the animal express the same rhythmic, seemingly purposeless pattern of behavior day in and day out breaks your heart. To make matters worse, the public reprimands us every day for our apparent lack of caring that this animal is pacing, "obviously because it's bored."

We think, "If only it did pace because it was bored...that would be easy to fix." But nothing seems to work to make the animal stop, and there seems to be relatively few clues as to the cause of the problem.

At the Calgary Zoo, we have been faced with this same problem numerous times. A number of years ago,

we developed a plan to address the stereotypy in an attempt to solve the problem. We assessed it from an holistic perspective. A three-pronged approach was used, which included: a) enrichment programming, b) enclosure design/redesign, and c) medical therapy. Enrichment was a key factor in fully describing the behavior and in problem solving.

To solve any problem, you must first understand the nature of it. Thus, the first step is to fully describe the stereotypy. Initially, this seems like it would be an easy task, but it can be complicated, require video equipment, and/or many hours of observation and record keeping. Surprisingly, you may get a lot of resistance to your efforts from other staff members. It seems that people can be very attached to their opinions about why a bear is stereotyping, whether or not they can prove them. Some of the current myths are: bears walk great distances in the wild so therefore they pace in captivity; bears are constantly searching for food in the wild so they pace in captivity to fill their time and get rid of excess energy; or they are bored.

The truth is that bears are highly adaptable and opportunistic. In the wild, they will not walk great distances for food if they do not have to, and some polar bear populations move further than others (Stirling, 1991). If you are a bear that happens to live near a nice garbage dump, then what's the use in moving seasonally? Bears are not constantly searching for food in the wild. Many have been shown to have long periods of down time. For example, polar bears near Churchill, Manitoba while away the Arctic summer hours in day-beds dug into the tundra (Stirling, 1991). There is no such thing as excess energy for an animal. Wild bears learn that it is not prudent to expend energy unless they have to.

In captivity, boredom can be one of the probable initial causes of a stereotypy, but the expression of a persistent, chronic stereotypy is then usually no longer responsive to the current stimuli of the environment. So what is this behavior? A stereotypy can be a normal response to a stressor or it can be an expression of a state of health. It commonly occurs in humans (Ridley, 1994) and a wide variety of domestic (Dodman et. al, 1987 and 1993) and non-domestic captive (Meyer-Holzapel, 1968) animal species. A stereotypy such as pacing can be a natural expression of excitement relative to an identifiable stimulus, or it can be a symptom of other problems. Some causes have been identified, and include such factors as stress, learned responses, brain damage, and illness (Kiley-Worthington, 1977). It is probable that a great number of stereotypies exhibited in zoos are associated with impoverished living environments, defined by small enclosures, interrupted visual pathways, scheduled feedings in one predetermined area, and lack of appropriate enclosure furniture and/or toys (Van Keulen-Kromhaut, 1978). Through time and repetition, the entrenched stereotypy is likely divorced from its original eliciting stimuli, and its performance becomes internally driven (Poulsen et. al, 1996). Sensory deprivation, as may occur in impoverished environments, is known to cause affective disorders such as obsessive compulsive disorder (OCD), seasonal affective disorder



Polar bear (*Ursus maritimus*).

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(SAD), or bipolar disorder. These may be involved with other disorders such as alopecia (hair loss) or epilepsy (Dodman et. al, 1993; Poulsen et. al, 1997, 1996).

Associated symptoms can often give you a clue as to what might be going on with your bear. For instance, baseline data for Snowball, an adult female polar bear housed at the Calgary Zoo, revealed that she had a facial tic, repeated

huffing/coughing, pacing, and a pace/swim/pace pattern as part of her stereotypic routine. Pathologic repetition of behavior can develop at various func-

tional levels (Ridley, 1994). Snowball exhibited repetitive behavior at the motor execution level (facial tic and huffing/coughing), the motor program level (pacing), and possibly at the planning level (pace/swim/pace pattern). When repetitive behaviors develop at more than one of these levels, it is thought that failure in the control system (the brain) is responsible (Ridley, 1982). This type of problem may ultimately require medical treatment as well as enrichment programming and enclosure design/redesign.

In order to describe the nature of a pacing problem, you need the animal to interact with something so you can assess behavior. If the animal lives in a sterile environment and is inactive, there is no way of defining the limits and expression of this behavior. To understand Snowball's problem, we decided to first test the idea that she was bored. Simply, if she was bored then she should stop pacing if we enriched her life. We developed an extensive enrichment program that included live, scatter, puzzle, and random feedings; novel objects; puzzle games; interacting with zookeepers; and bedding choices. We improved the exhibit by filling it with woodchips and dirt, putting boulders into the pools to change water levels, and placing massive tree trunks around to create viewing vantage points.

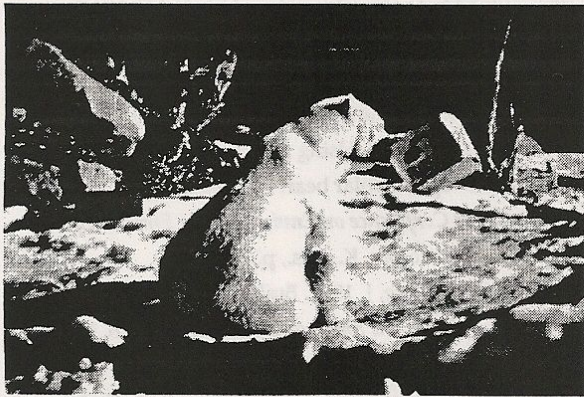
We learned a great deal about Snowball's behavior in this environment. To test the bore-

dom theory, we enriched her all day long. There was not a moment in the day that she did not have a novel object or an event to take part in. We soon learned that there seemed to be a ceiling on the number of events that Snowball could take part in before she went back to pacing. Depending on the day, Snowball could do about three to four events, and then it seemed as if she compulsively had to go back to pacing (Poulsen et. al, 1995; Forthman, 1992; Wechsler, 1992 and 1991). We even tried to entice her away from the pacing path by littering the enclosure with ice cream balls that we threw in from above. Snowball would look at the ice cream balls and salivate but she could not tear herself away from the pattern. We came to understand that Snowball had no control over her compulsion to pace.

It soon became clear that there were many similarities between Snowball's behavior and obsessive-compulsive disorder as expressed in humans and dogs. We used enrichment, enclosure design/redesign, and medical therapy to help Snowball with her pacing. The therapy of choice was fluoxetine, since it had a proven success rate, affected only the serotonergic system, and had fewer side effects. Using this holistic approach, we were able to reduce Snowball's 20-year pacing problem from 70% per day to 0% per day (Poulsen et. al, 1996, 1995).

We believe that enrichment played a large role in the solution. When Snowball was no longer pacing, she replaced that with bear behaviors, which included investigating her environment. If we had not continued with the enrichment program, there would not have been anything for her to do. If this had been the case, we would question the ability of the drug to act as effectively as it did.

We also used this diagnosis and problem-solving method on another female polar bear named Misty housed at the Calgary Zoo. Misty's pacing pattern and associated symptoms were very different from Snowball's. Using enrichment and enclosure redesign, we were able to understand the intricacies of her problem. In the initial phase of the research, it was found that her pacing pattern correlated significantly on a daily basis with the amount of daylight available. In general, a seasonal pattern emerged. There was no pacing in the summer months, but pacing in the fall, winter, and spring could be dramatic, involving 80 to 95% of her time per day (Poulsen



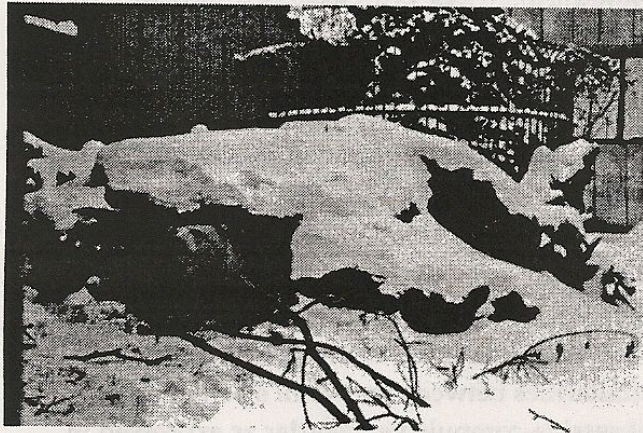
Misty investigates a cardboard box.

Elise Poulsen



et. al 1998).

Since Misty had lived with Snowball, she was already benefiting from all the enclosure and husbandry improvements. After Snowball died, we decided to build Misty a summer den to further help diagnose and assist her problem (Poulsen, 1997). Building this den out of sewer cement culverts, dirt, and woodchips was one of



Misty snug in her den.

the best types of enrichment that we had ever done. Misty built her life around the den. She spent time fluffing her nest every day, and once every week or ten days she would

clean out the whole thing. She set her daily routine by cleaning, nest building, napping, and eating at specific times of her choice. At this time her pacing was remarkably reduced.

However, this period of good mental health did not last. She developed seizures, and manic pacing seemed to be a part of that pattern. Medical therapy was used in the form of fluoxetine and valproate. Fluoxetine reduced her pacing significantly (Poulsen et. al, 1998). Misty could then take part in enrichment events when she was not exhibiting seizure behavior.

Enrichment played a large role in the accurate description of the chronic stereotyping problem of these two bears, and in the eventual solution to the problem. Enrichment creates a more complex environment, and a complex environment creates good mental health. Good mental health is really our goal with enrichment. The behaviors that are expressed as a result of enrichment are the indicators of our success. ♦

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