

CHAPTER TWENTY-TWO

If I Could Talk to the Animals... Reinforcement Interactions as Communication

by Karen Pryor¹

Operant conditioning and dolphin training

Humans have been training animals for thousands of years. The model for our training behavior is our social behavior toward subordinates: "You do what I say, or else!" Most domestic animals are genetically adapted to respond with appropriate behavior, that is, moving away from spur, goad, or whip, without exhibiting either fight-or-flight reactions.

A new training system, based upon operant conditioning and positive reinforcers, is now enabling us to train animals unmanageable by traditional methods, and to establish new kinds of interactions and understanding. The sophisticated use of reinforcement began in the dolphin training community in the early 1960s. Two innovative scientists were, in my opinion, responsible for this event: Dr. Kenneth Norris, a biologist and then curator of Marineland of the Pacific, and Dr. William McLean, a civilian scientist working for the U.S. Navy. Both men

¹Adapted from the President's Invited Scholar's Address, Association for Behavior Analysis Annual Convention, San Francisco, 1992.

wanted to study aspects of dolphin behavior and physiology; both hired students of B.F. Skinner to develop training programs for research. Dr. Norris also recommended behavioral psychologists to several brand-new oceanariums, including Sea World, and Sea Life Park in Hawaii. These behaviorist trainers—Ron Turner, Kent Burgess and Keller Breland, and the corps of trainers they taught, of whom I was one—changed the face of animal training, perhaps forever.

The dolphins we trained were, of course, a contributing factor, not because of their vaunted intelligence, but because they were unusually suitable subjects for the new approach. First, like most domestic animals, they are a social mammal, more given to interaction than to fight-or-flight responses; they are easy to “tame.” Second, they are large animals that can ingest a lot of reinforcements before satiating; that gives the trainer room for error. Third, they live in the water; they can’t get at us and we can’t get at them. Thus one need not fear personal injury (always a possibility in the training of horses, for example), and perhaps more important, the traditional aversive control of harness, leash, and spur is not easily available. Finally, we had no tradition of training dolphins in captivity; there were no established methods, no wise old trainers telling us “You can’t do that,” or “You have to do it this way.” We were free to innovate.

Marine mammal trainers—of whom there are now over 1000—differ from traditional trainers not only in their conscious use of operant conditioning, and their reliance on the conditioned positive reinforcer, but also in their aims: they do not aim at producing a finished product—a Seeing Eye dog, a race horse—but at developing a process through which the animal can keep on learning any behavior that it is physically and mentally capable of doing.

Social signaling

This kind of training is, in effect, a system of communication. First, operant conditioning allows the trainer to communicate to the animal, by means of the conditioned reinforcer, the specifics of any desired behavior. I can “tell” a dolphin not just the command, “Jump!” but how high, what shape of arc to make

in the air, in what direction, how often, with what tail and head posture in the air. I can add cues for the jump, and a time limit; I can require that the jump be made in the company of specific other animals, and in synchrony. And I can establish that and many more criteria in perhaps fifteen or twenty ten-minute training sessions.

The experience can arouse states of affect in the animal, ranging from elation to frustration and distress. Trainers quickly learn to read the signals given inadvertently, such as increased respiration rates, to gauge the internal state of the animal. Meanwhile, the conditioned reinforcer becomes not just a signal that food is coming, but what Ogden Lindsley calls an "event marker," a source of information to the animal. That is reinforcing in itself. The animal seeks information. Since the trainer is the source of information, a new kind of communication soon arises: the animal begins to direct at the trainer the social signals it would direct toward a member of its own species, expressing its state of affect.

In dolphins this may range from a social greeting gesture, such as rolling partly on one side, to attempts to strike the trainer with the rostrum. Training with reinforcement leads to social signaling in other species, as well. At the National Zoo, I was watching a keeper shape the behavior, in a tiger, of getting into the moat and retrieving a floating toy to the shore. The wind came up, and blew the toy across the moat, near the place where the trainer was standing. The tiger looked up at its keeper with big yellow eyes and said, perfectly clearly, "Meow?" meaning, "Help," or "You get it for me!"

This interspecific social signaling is especially useful if one is working with a species in which the social signaling is not well understood. Ethologists learn about social behavior by observing animals interacting in the natural environment. The operant setting gives one a short cut. There is, for example, much speculation in the scientific literature about the role of aerial acrobatics in dolphins. Jumping and flipping about has been attributed to everything from sexual display to parasite removal. However, if I am bringing a dolphin's behavior under stimulus control, we may enter a period where the signal is absent and

the behavior must be allowed to extinguish. Extinction breeds frustration; if, during this period, the animal leaps into the air and comes down sideways in such a way as to soak me from head to foot, I can say, based on a single event, that in some cases, at least, jumping has to do with aggression.

The transformation of the sea lions

This kind of social exchange does not constitute real socialization, of course. The polar bear that gives its keeper a play invitation through the bars would probably be glad to eat the keeper, were the bars not there. The reinforcement training system, however, can lead to genuine socialization, communication on an even richer level. A case I have witnessed myself is the transformation of the sea lions.

When I began working as a trainer in the 1960s, sea lions had been kept in captivity and trained, far longer than dolphins; even the Romans had a trained sea lion act. But they had a reputation. They were unfriendly; they bit; they did not like to be touched. They worked for food, but not willingly. One old circus trainer gave me this advice about sea lions: "They're bad-tempered; they're not too bright; they bite like hell. Keep 'em hungry and carry a two-by-four." Keeping them hungry, in order to force compliance, meant that most of the sea lions one saw in captivity in my childhood were small, compared to wild sea lions, and a bit thin. Also they were known as one of the commonly kept animals that apparently could not reproduce in captivity.

Then oceanariums began, for convenience usually, assigning the care of the sea lions to the dolphin trainers. Dolphin trainers, inevitably, and for convenience, began managing sea lions as they did dolphins: with conditioned reinforcers, conditioned stimuli, and shaped behavior. First, they stopped food depriving; with a conditioned reinforcer food deprivation is not needed. An immediate result was that the dispositions of the sea lions improved. Another result was that sea lions began to grow. An adult male in the wild may weigh over a thousand pounds, and stand much higher than a person; oceanaria began developing fully mature males.

Trainers began using shaping to reinforce what oceanariums call "husbandry" behavior—behavior that facilitates physical care and medication of the animal. This includes shaping the behavior of sitting still while being touched. Soon trainers discovered that they could use touch itself as a reinforcer. Indeed, in the wild, sea lions touch each other all the time, and lie around in congenial heaps on rocks. They in fact enjoy being touched, but only by human beings they like; those fellows with the two-by-fours were not popular.

Now, in less than three decades, sea lions have become incredibly trustworthy. I have seen trainers take huge male sea lions swimming in the ocean, without losing them to the wild; or out amongst the public, where children are allowed to touch them. Backstage at one oceanarium I was amused to see a group of sea lions basking in the sun, while their trainers, on their lunch break, lay around among them; one trainer had his back against a large, plump sea lion and his feet up on a smaller one, while reading a book and eating an apple. They are not pets—behavioral control is maintained carefully—but they are definitely social companions.

Furthermore, now that males are allowed to grow to full size, and females are well-nourished, sea lions reproduce abundantly in captivity. Sea lion pups are a glut on the market, and some institutions have resorted to IUDs.

Musical cats and dogs

Reinforcement training allows the trainer to communicate some rather sophisticated concepts; for example, by giving a jackpot, an unusually large reinforcement, one can signal that the behavior that has just been offered is especially wonderful. On the other hand, by giving a much smaller-than-normal amount one can signal that what the animal is doing is not quite right, or not quite up to par, very useful when an animal begins minimizing its effort deliberately. As trainer Ingrid Shallenberger puts it, with a "mini-reinforcement" you can indicate, "You know what you are doing wrong, and now you know that I know what you're up to, as well." Social signaling such as eye-contact can also be used or avoided deliberately, to convey information.

A corollary to this is that animals too can begin to use the behavior learned in reinforcement interactions to convey information outside the training situation. For example: I was having dinner with my cousin and his family, and after dinner, to amuse the children, I trained the cat to play the piano. That is, I used a word, and bits of ham, to shape the behavior of sitting on the piano bench and plinking at the keys with one paw.

After that one evening, no one ever asked the cat to do this again, nor did the cat offer the behavior. Two years later, my cousin called to say that the previous night, after they had gone to bed, they were wakened by sounds from the piano downstairs in the living room. The livingroom door had been shut to conserve heat. On investigation, my cousin found the cat sitting on the piano bench. Normally the cat slept upstairs in the bedroom. It had accidentally been left behind in the livingroom. When, one presumes, the normal responses of meowing and perhaps scratching at the door didn't work, the cat offered a learned behavior to ask, not for food, this time, but for its preferred sleeping place; and the effort was a success.

My colleague, Gary Wilkes, was coaching a family with several dogs, including a dachshund. While training the larger dogs he noticed the dachshund moving backwards in a comical way reminiscent of Michael Jackson's "moonwalk" dance step; so he reinforced the behavior. On a subsequent visit, one of the larger dogs had a bone. The dachshund, wanting the bone, "moonwalked" at the other dog. This, of course, did not work.

What we have here, however, is neither the world's smartest cat nor the world's dumbest dachshund, but two examples of animals using the learned behavior they have been given, as a communicative tool.

Pony's choice

The reinforcement exchange can proceed easily to the abstract level; one example is my own work, and that of others, in teaching creativity, that is, innovative behavior. Other fascinating outcomes of this rich learning circumstance include the ape-language experiments, Irene Pepperberg's remarkable parrot

experiments, Louis Herman's work with artificial languages with dolphins, and Ron Schusterman's studies of abstract learning in sea lions. However, it doesn't require a phenomenally intelligent species to carry the game to an abstract level. Here is an example involving a horse.

My neighbor and fellow trainer Pat Brewington bought a Percheron colt: Pat weighs about 100 pounds, and Percherons are enormous. There was no way Pat could train this horse by whips, chains, and force, the traditional method. She trained the horse, James, with a clicker and carrots, and was able in this way to shape him to carry a rider, wear a harness, and so on: the traditional tasks. Pat also plays games with her horses: for example, there is a place in our woods where one of the trails forks; both ways lead home, and they are of equal length. Sometimes Pat asks her horse to go left, sometimes right; and sometimes she loosens the reins and says "Pony's choice," and lets the horse decide. Sometimes they go left, and sometimes right. The same game can be played with a log in the trail; they can go around it, they can jump over it, or Pat can say "Pony's choice" and let the horse decide; again, sometimes her horses decide one way and sometimes the other.

I was invited to watch James having his first lesson of actually hauling logs, sections of cut-down trees, the ultimate work for which he had been purchased. Having trained horses myself, I knew that the first experience of something new is especially important. Horses learn fast. If something goes wrong, they never forget it; I have personally built behaviors into young horses, by accident, that created problems for years.

Now, in James' paddock, a big tree had been felled and cut up into ten-foot-long logs. Pat walked behind the horse, guiding him with long reins and voice commands. James would be driven alongside the log until he was in front of it, so that the attachment point on his harness, the singletree, could be hooked onto a chain on the log. Then he would be urged forward, to drag the heavy log to the log pile outside the paddock.

The first log went fine. At the second log, James walked quietly beside the log and actually parked himself in the proper place to be hooked up. The third log, however, was further back in the

paddock, toward the base of the tree, in a muddy spot. Pat tried to drive James alongside the log, and he balked, ears laid back: "I don't want to go there."

This was a dangerous moment. Were the young horse to learn, now, that balking "works," he might well balk forever. A traditional trainer would instantly have laid into him with voice and whip to force him forward. Pat doesn't own a whip. What was she going to do?

What she did was slacken the reins and say "Pony's choice." James looked at the mud, ears forward, and then he carefully stepped *over* the log and came forward along the other side. He thought the ground looked safer on the far side of the log. Pat had developed a cue, in a very young horse, that meant, "Use your own judgment." Horses do have some judgment, particularly about where to put their feet; the folk expression, "horse sense," is not wrong. Now, for the rest of James' life, Pat has a horse of whom she can say, "I'm not sure what's the best way to pull this log, left or right—let's ask James."

Applications and implications

Are these just anecdotes about animals? I think not; these are descriptions of observations. And unfashionable as it may be at present, observation and description are as much a part of science as hypothesis and experiment. Every one of these examples was elicited by an operant conditioning exchange. Therefore, they are replicable, and thus available to hypothesis and experimentation. Some of these interchanges, even those that have become standard training devices, are not represented in the behavioral literature, and should be fruitful sources for investigation.

What if one works with people, not animals? Are these trainerly interactions irrelevant? I think not. The sophistication and richness of communication that reinforcement training develops in animals can apply in human situations as well. Suppose, for example, that you are working with someone who can't communicate verbally: who is too old, or too young, or too damaged. Would it not be useful to be able to shape the behavior of confident cooperation in, say, necessary medical procedures, even without words?

Or, suppose you would like to communicate with somebody who doesn't take instructions from you, and whose behavior is not governed by your rules—such as your boss. The operant trainer looks at these problems in a fresh way. Recently I heard behavior analysts talking about a wonderful program in the hospital where they worked. The patients were responding beautifully; the psychologists wished to expand the program. For that they needed more money. The hospital administrator, however, was not interested; one staff member commented ruefully, "All he cares about is clean halls." Of course the administrator may have reasons of his own for needing clean halls, such as Congressional inspection tours coming up; but the behaviorists were discouraged.

A dolphin trainer, however, would respond differently: "He wants clean halls? Got him!" That is, if you have something the animal wants, all you have to do is make it contingent on what you want, and you can get the desired behavior.

Gary Priest, head trainer at the San Diego Zoo and Wild Animal Park, told me that he was watching Carl Sagan, the astronomer, on television. Dr. Sagan was speculating about meeting another life form, in space. How would we ever communicate with them, if they were totally alien? Priest, of course, being a reinforcement trainer, saw no problem. If they are alive, they need an energy source. If they need energy sources, you can reinforce them. And reinforcement exchanges rapidly lead to communication. We don't have to struggle to imagine a way to communicate, even with little green extragalactics—we already have one.