BY THE SAME AUTHOR

Emergence: Labelled Autistic
Livestock Handling and Transport

Temple Grandin

Thinking in Pictures

and Other Reports from My Life with Autism

DOUBLEDAY
New York
London
Toronto
Sydney
Auckland

1995

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A Cow's Eye View

Connecting with Animals

ONE THIRD of the cattle and hogs in the United States are handled in facilities I have designed. Throughout my career I have worked on systems to improve the treatment of livestock. The principle behind my designs is to use the animals' natural behavior patterns to encourage them to move willingly through the system. If an animal balks and refuses to walk through an alley, one needs to find out why it is scared and refuses to move. Unfortunately, people often try to correct these problems with force instead of by understanding the animal's behavior. My connection with these animals goes back to the time I first realized that the squeeze machine could help calm my anxiety. I have been seeing the world from their point of view ever since.

People ask me all the time whether the cattle know they are going to be slaughtered. What I have observed over the years and at many meat plants is that the things that frighten cattle usually have nothing to do with death. It is the little things that make them balk and refuse to move, such as seeing a small piece of chain hanging down from an alley fence. For instance, a lead animal will stop to look at a moving chain and move his

head back and forth in rhythm with its swing. He isn't concerned about being slaughtered; he's afraid of a small piece of chain that jiggles and looks out of place.

Most people do not observe these simple things because they get the cattle too excited by poking and prodding them when they refuse to move through an alley or out of a pen. When cattle are excited, it is impossible to determine what is bothering them. They go into antipredator mode and push themselves together in a boiling ball of circling, agitated animals, with their heads toward the center of the group. The smallest distraction can stop a group of cattle moving through an alley. I remember one time when a meat plant became totally chaotic because a plastic juice bottle had fallen into the entrance where the cattle lined up to walk into the plant. They absolutely refused to walk over the white plastic bottle. Anything that causes visual contrast will attract the animals' attention. They fear a drain gate across a concrete floor or a sparkling reflection from a puddle. Sometimes moving an overhead lamp to eliminate a reflection on a floor or wall will make it easier to move cattle and hogs. Poor lighting can cause many problems. Cattle and hogs will not walk into a dark place, so installing a lamp to illuminate the entrance to an alley will entice them to enter. Animals, like people, want to see where they are going.

When I put myself in a cow's place, I really have to be that cow and not a person in a cow costume. I use my visual thinking skills to simulate what an animal would see and hear in a given situation. I place myself inside its body and imagine what it experiences. It is the ultimate virtual reality system, but I also draw on the empathetic feelings of gentleness and kindness I have developed so that my simulation is more than a robotic computer model. Add to the equation all of my scientific knowledge of cattle behavior patterns and instincts. I have to follow the cattle's rules of behavior. I also have to imagine what experiencing the world through the cow's sensory system is like. Cattle have a very wide, panoramic visual field, because they are a prey species, ever wary and watchful for signs of

danger. Similarly, some people with autism are like fearful animals in a world full of dangerous predators. They live in a constant state of fear, worrying about a change in routine or becoming upset if objects in their environment are moved. This fear of change may be an activation of ancient antipredator systems that are blocked or masked in most other people.

Fear is a universal emotion in the animal kingdom, because it provides an intense motivation to avoid predators. Fear is also a dominant emotion in autism. Therese Joliffe wrote that trying to keep everything the same helped her avoid some of the terrible fear. Tony W. wrote that he lived in a world of daydreaming and fear and was afraid of everything. Before I started taking antidepressants, minor changes in my daily routine caused a fear reaction. There were times that I was dominated by fear of trivial changes, such as switching to daylight savings time. This intense fear is probably due to a neurological defect that sensitizes the nervous system to stimuli that are minor to normal people.

In order to survive, members of a prey species such as cattle or sheep have to be ever vigilant and flee when they spot a predator. Cattle and sheep have supersensitive hearing, an acute sense of smell, and eyes on the sides of their heads so they can scan the landscape while grazing. They are much more sensitive to high-pitched sounds than people and can hear sounds that are outside the range of human hearing.

High-pitched sounds tend to be more disturbing to them than low-pitched sounds. Tom Camp, a USDA researcher in Texas, found that a loud bell on an outdoor telephone caused a calf's heart rate to jump suddenly by fifty to seventy beats per minute. It's unlikely that anyone but me would have noticed that the sounds that upset cattle are the same kinds of sounds that are unbearable to many autistic children with overly sensitive hearing. A sudden hissing similar to that caused by the air brakes on a semi truck will trigger a strong startle reaction in both calves and cattle. When calves hear this sound, they instantly lay their ears against their heads and back up to get away

from the source of the noise. Like cattle, a person with autism has hypervigilant senses.

Even today, a person whistling in the middle of the night will cause my heart to race. High-pitched sounds are the worst. High, rapidly repeated sounds are stimulating to the nervous system. P. B. McConnell and his colleague J. R. Baylis, in Germany, found that dog trainers use high-pitched intermittent sounds to stimulate a dog to do something like fetch, while low sounds are used to make it stop, such as saying "Whoa" to a horse. In tame animals the high-pitched sounds have a mild activating effect, but in wild animals and autistic children they set off a massive fear reaction.

Contrary to popular belief, cattle and other livestock can see color, but their visual system is most attuned to detecting novel movement. Cattle vision is like having wide-angle camera lenses mounted on the sides of your head. The animals have 360 degree vision and can see all around themselves, except for a small blind spot behind their rear ends. However, the price they pay for wide-angle vision is a very narrow field where they can perceive depth. To do that, cattle have to stop and put their heads down. Predatory species, such as lions, dogs, cats, and tigers, have their eyes on the front of their heads, which enables them to perceive depth and accurately judge distances when they leap and bring down their prey. Eyes on the front of the head provide superior binocular vision, whereas eyes on the sides of the head provide the ability to scan the environment and be constantly vigilant.

In the old American West, novelty sometimes triggered stampedes during the great cattle drives. A hat blowing in the wind or a horse bucking would set off the instinct to flee. It is possible to desensitize cattle to novelty, however. For example, calves in the Philippines are grazed along the highways from birth. They learn that all the sights and sounds of the highway will not hurt them. These tame, halter-broken animals are not perturbed by anything.

Most cattle on American ranches are exposed to far less nov-

elty. Coats and hats left on fences will often cause them to balk and refuse to walk by. When a steer is calm in its familiar home feedlot pen, the same hat or coat left on a fence may evoke first fear and then curiosity. The steer will turn and look at the coat and then cautiously approach it. If the coat does not move, he will eventually lick it. A coat that is flapping in the wind is more likely to make animals fearful, and they will keep their distance. In the wild, sudden movement is a sign of danger; it may be a lion in a bush or an animal fleeing from a predator.

The reaction of cattle to something that appears out of place may be similar to the reaction of autistic children to small discrepancies in their environment. Autistic children don't like anything that looks out of place—a thread hanging on a piece of furniture, a wrinkled rug, books that are crooked on the bookshelf. Sometimes they will straighten out the books and other times they will be afraid. Their fear reaction may be similar to a cow's reaction to a coffee cup in an alley or a hat on a fence. Autistic children will also notice minor discrepancies that normal people ignore. Could this be an old antipredator instinct that has surfaced? In the wild, a broken branch on a tree or disturbed earth is a possible sign of predator activity in the vicinity. The animal that survives and avoids the lions is the one that has developed the finest abilities in detecting warning signs of changes.

Cattle, deer, and antelope will turn and face a source of potential danger that is not immediately threatening. Cows on a pasture will turn and face an approaching person, and antelope on the African plains will turn toward and sometimes follow a lion. After all, the lion they can see is less of a threat than a lion they cannot see. The animals will follow the lion but remain at a safe distance, which enables instant flight. This is known as the animal's flight zone.

People working with cattle reared on the open range can use the principles of the flight zone to move groups of animals efficiently and quickly. The size of the flight zone will vary depending on how tame the cattle are. Tame dairy cattle may

have no flight zone, and they will approach people for petting. Beef cattle raised on western ranches are not completely tame, and they will move away if people go too close to them. The flight zone can vary from five feet to over one hundred feet. Excited cattle will have a larger flight distance than calm cattle. H. Hedigar stated in his book *The Psychology and Behavior of Animals in Zoos and Circuses* that taming is the artificial removal of the flight distance between animals and people.

It is fairly easy to move groups of cattle in a quiet and orderly manner if people work on the edge of the herd's collective flight zone. Deep invasion of the flight zone, however, may cause cattle to panic. If they are cornered in a pen, they may attempt to jump a fence to increase the distance between themselves and a threatening person.

Therapists have observed that autistic children often lash out when they stand close to other children while waiting in a line. They become tense when other children invade their personal space. Having another child accidentally brush up against them can cause them to withdraw with fear like a frightened animal. A light unexpected touch triggers flight, and a firm touch, similar to the pressure of a tightly bunched herd of cattle, is calming.

A great deal of my success in working with animals comes from the simple fact that I see all kinds of connections between their behavior and certain autistic behaviors. Another example is the fact that both cattle and people with autism can become very set in their habits. A change in a daily routine can cause an autistic person to have a tantrum. Such changes used to make me very anxious. Ranchers have discovered that cattle placed on a new pasture must be encouraged to graze the entire area when they are first put there. I observed a lazy group of bulls that refused to walk less than a quarter of a mile to a good pasture. Why do cattle do this? It may have something to do with instincts to avoid predators. When cattle learn that a certain area is safe, they become reluctant to move to a new area, which may contain danger.

An experiment that Ken Odde and I conducted at Colorado State University indicated the great strength of a bovine's reluctance to change a previously learned safe route. Cattle were given a choice between an alley that led to a squeeze chute and an alley that they could just walk through. The animals quickly learned to avoid the side where they would be restrained in the squeeze chute. When the alleys were switched, most of the cattle refused to switch sides to avoid restraint. Being held in a squeeze chute is slightly uncomfortable, but not so aversive that the animals were willing to change from the previously learned safe route. When something really painful or disagreeable happens, though, most animals will quickly change to avoid it. Mary Tanner, a student at Colorado State University, found that most cows at a dairy were willing to enter both sides of a milking parlor, but a few were very rigid and always entered on the same side.

Preliminary evidence indicates that the more nervous and excitable cows are the ones that are the most reluctant to change a previously learned safe route. Resistance to change may be partially motivated by attempts to reduce anxiety. In my own experience, minor changes in my high school class schedule or switching from daylight savings time to standard time caused severe anxiety. My nervous system and the nervous systems of some other people with autism are in a state of hyperarousal for no good reason. Before I took antidepressant drugs, my nervous system was constantly ready to flee predators. Insignificant little stresses caused the same reaction as being attacked by a lion. These problems were created by abnormalities in my nervous system. Now that the medication has calmed my nerves, I can take small changes in routine in stride.

One of the most stressful events for semiwild cattle is having people deeply invade their flight zone when they are unable to move away. A person leaning over the top of an alley is very threatening to beef cattle that are not completely tame. Cattle will also balk and refuse to walk through an alley if they can see

people up ahead. This is one of the reasons that I designed curved single-file alleys with solid sides. They help keep cattle calmer. The solid sides prevent the animals from being frightened by people and other moving objects outside the alley. A curved alley also works better than a straight one because the cattle are unable to see people up ahead, and each animal thinks he is going back where he came from.

Understanding these kinds of sensitivities made it possible for me to figure out ways to calm flighty antelope at the zoo when other people were convinced that it was impossible to train them to cooperate during veterinary procedures. These procedures were often very stressful, because the animals had to be either shot with a tranquilizer dart or grabbed by people. Antelope can be trained to accept new procedures and novel sights and sounds if those things are introduced gradually and quietly, while the animals are fed treats. I worked with students Megan Phillips, Wendy Grafham, and Mat Rooney to train nyala and bongo antelope to enter a plywood box willingly and stand still during veterinary procedures such as blood testing and injections. The solid sides on the box provided the animals with a sense of safety and security. While they munched on treats, the veterinarian worked on them. During training, we had to take care to avoid triggering a massive fright reaction in these prey-species animals. They had to be carefully desensitized to the sound and movement of the doors on the box, and to people reaching into the box and touching them.

The crafty animals quickly learned to enter the box to get the treats and then kick the moment a blood test was attempted. To stop this, we withheld the treat until the animal stood still and cooperated. Trainers have to discriminate between kicking because of fear and kicking simply to avoid doing something the animal doesn't want to do. Withholding a feed reward will stop learned kicking, but it will have no effect on kicking or thrashing due to fear.

People who work with nonverbal, low-functioning people with autism must similarly be able to determine whether a

tantrum or other bad behavior is caused by fear or pain or is a learned avoidance response. Sometimes it's because of pain from sounds that hurt their ears or fear of an unexpected change in routine. Like the cattle and the antelope, autistics are afraid of the unexpected. But sometimes they throw tantrums simply to get attention or to avoid doing a certain activity or school lesson. In one study, aggression and outbursts were greatly reduced in very severely handicapped autistic adults by giving them an object to hold fifteen minutes before they were scheduled to have lunch or ride on the bus. A spoon was used before lunch, and a toy bus was used before riding on the bus. Touch was the only sense that was not confused by sensory jumbling, and holding the object let these people get mentally ready for the next event in their daily routine. There were times when I threw a big tantrum just to watch the grownups react. Observant teachers can tell the difference between a massive fear reaction and the calculated use of bad behavior to avoid tasks the person does not want to do.

People Problems

Mistreatment by people is the number-one cause of animals becoming frightened. The best equipment in the world is worthless unless management controls the behavior of plant employees. When I first started designing equipment, I naively believed that if I could design the perfect system, it would control employee behavior. This is not possible, but I have designed equipment that requires very little skill to operate, provided employees are gentle. Good engineering is important, and well-designed facilities provide the tools that make low-stress, quiet handling at slaughter possible, but employees must operate the system correctly. Rough, callous people will cause distress to animals even if they use the best equipment.

Management attitude is the most important variable that determines how animals are treated. I wouldn't be surprised if this were true of any organization. Livestock handling has greatly

improved during the past ten years, and managers are becoming more sensitive about animal welfare, but there still needs to be improvement. It is very painful for me to watch somebody abuse an animal, especially when it happens in one of my systems. Some people buy new equipment and think that it is a substitute for good management. Over the years I have seen animal handling improve with a change in management, and I have seen it get rough and nasty when a good manager left. A good manager serves as a conscience for the employees. He has to be involved enough to care but not so involved that he becomes numb and desensitized. One cannot rely on the foreman to enforce good behavior. This person often becomes immune to animal suffering on the slaughter floor. The manager who enforces good animal handling is usually most effective if he is at the plant-manager level. Someone in a distant headquarters office is often too detached from the reality of the slaughter floor to be concerned.

Plants that have high standards of animal welfare enforce strict codes of conduct. One manager built his office so that he could see the stockyards and the cattle ramp that led into the plant. If he saw employees hitting or whipping the cattle, he called the foreman. Employees who handle thousands of animals often become careless and hard. The people who actually kill the animals should be rotated, and complete automation of the actual killing procedure is good for employee well-being. Automation of killing is especially important in very high-speed plants, with rates of over 150 cattle per hour. A person becomes a zombie when he has to shoot thousands of cattle every day. At slower speeds one can take pride in doing the job humanely and treat each animal with respect, but at high speeds it's all one can do to keep up with the relentless movement of the line.

Management also has to be willing to take the time and make the effort to improve handling methods. Employees have to be trained to understand cattle behavior and use the natural instincts of the animals to assist movement. Trained employees

learn to time groups of animals so that they will follow the leader. Each group must be driven up to the single-file alley just as the last animal from the previous group is walking into it. If the next group is driven up too quickly, the cattle or hogs will turn around, because there is no place to go. I love nothing more than to watch a plant I've designed run smoothly and efficiently, knowing that the animals are being treated with decency.

I'm always surprised at the number of people who think that the "jungle" still exists at the Chicago stockyards. The Chicago stockyards have been gone for more than thirty years. When I discuss my job with fellow travelers on airplanes, many ask if a sledgehammer is still used. That was banned by the Humane Slaughter Act in 1958 in all meat plants that sold to the U.S. government. In 1978 the act was strengthened to cover all federally inspected plants that sell meat in interstate commerce. The Humane Slaughter Act requires that cattle, pigs, sheep, and goats must be instantaneously rendered insensible to pain prior to slaughter. The act does not cover poultry or ritual slaughter by any religious faith. The law requires that animals are rendered insensible to pain by either captive bolt stunning, electrical stunning, or CO_2 gas. Captive bolt kills the animal instantly by driving a steel bolt into the brain. It has the same effect as a gun. Electrical stunning causes instantaneous unconsciousness by passing a high-amperage electrical current through the brain. It works the same way as electroconvulsive shock treatment in people. If the procedure is done correctly the animal becomes instantly unconscious.

People often ask me if animals are afraid of blood. Again it's the small distractions that scare the animals more than blood. Blood or urine from relatively calm cattle appears to have no effect, but blood from cattle that have become very frightened may contain a "smell of fear" substance. If the cattle remain relatively calm they will voluntarily walk into a chute with blood on it. But if an animal becomes severely stressed for over five minutes the next animal will often refuse to enter.

Design of Restraint Equipment

Many people who design systems to restrain animals don't think about what the device will feel like to the animal. Some engineers are strangely unaware that a sharp edge will dig and hurt. They build devices that mash the animal or dig into it. Restraint equipment used to hold cattle or hogs for either veterinary work or slaughter often squeezes the animal too hard or holds it in an uncomfortable position. One of the reasons I am good at designing this equipment is that I can visualize what the device will feel like. I can put myself into a twelve-hundred-pound steer's body and feel the equipment. What would it be like with a gentle person operating it? What would it be like with a rough person operating it? When I see somebody squeeze an animal too hard in a squeeze chute, it makes me hurt all over.

One of my crusades in the meat industry has been to eliminate shackling and hoisting as a method of restraint in kosher slaughter plants. The main animal welfare problem with kosher slaughter is the dreadful methods of restraint used in some plants. The variable of the restraint method must be separated from the variable of the actual shehita kosher cut, which is performed on a fully conscious animal. In kosher slaughter, a special, razor-sharp, long straight knife is used. When the cut is made correctly according to the rules outlined in the Talmud, the animal does not appear to feel it. The Talmud states that there cannot be any hesitation during the cut and the incision must not close back over the knife. The knife must have a perfect blade and be free of nicks, because a nick would cause pain.

I will never forget having nightmares after visiting the now defunct Spencer Foods plant in Spencer, Iowa, fifteen years ago. Employees wearing football helmets attached a nose tong to the nose of a writhing beast suspended by a chain wrapped around one back leg. Each terrified animal was forced with an

electric prod to run into a small stall which had a slick floor on a forty-five-degree angle. This caused the animal to slip and fall so that workers could attach the chain to its rear leg. As I watched this nightmare, I thought, "This should not be happening in a civilized society." In my diary I wrote, "If hell exists, I am in it." I vowed that I would replace the plant from hell with a kinder and gentler system.

Ten years ago I was hired by the Council for Livestock Protection in New York to develop a humane upright restraint system for kosher calves. The council was a consortium of major animal advocacy groups such as the Humane Society of the United States, the American Society for the Prevention of Cruelty to Animals, the Fund for Animals, the Massachusetts SPCA, the American Humane Association, and others. It was formed in the early seventies to replace shackling and hoisting with more humane methods of restraint. At this time, upright restraining equipment existed for kosher slaughter of large cattle, but no equipment was available for calves or sheep. When the Humane Slaughter Act was passed in 1958, kosher slaughter was exempted, because no humane alternatives to shackling and hoisting of fully conscious animals existed.

Walter Giger, Don Kinsman, and Ralph Prince, at the University of Connecticut, had demonstrated that a calf can be restrained in a comfortable manner when it straddles a moving conveyor. The animal rides the conveyor like a person riding a horse, supported under the belly and chest. Solid sides on each side of the conveyor prevent it from tilting off. The Connecticut researchers had a good idea, but I had to invent many new components to construct a system that would work in a commercial slaughter plant. To make the new system work, I had to eliminate all pressure points which caused discomfort to the animals. For example, uncomfortable pressure on the leg joints caused calves to struggle and fight the restrainer. Elimination of the pressure points resulted in calm, quiet calves.

One of the advantages of a conveyor restraint system for both conventional slaughter, where cattle are stunned, and ritual

slaughter is that the cattle move through it in a continuous line. Each animal has its head on the rear of the animal in front of it. Having observed cattle, I realized that they remain calmer when they can touch each other. Since the cattle were in continuous contact with each other, they remained calmer at the slaughter plant than at the squeeze chute at the Colorado State University Experiment Station. I've also observed that cattle are accustomed to walking in single file. An overview of a cow pasture shows the small, twelve-inch-wide cowpaths. Walking in single file is part of the nature of cattle. This is why a system that handles cattle moving through in single file works well.

Many people do not believe me when I tell them that cattle slaughter can be really calm, peaceful, and humane. In some plants, the cattle remain absolutely calm and the employees are very conscientious. At one large plant, 240 cattle per hour quietly walked up the ramp and voluntarily entered the double-rail conveyor restrainer. It was as if they were going in to get milked. Each fat steer walked into the restrainer entrance and settled down on the conveyor like a little old lady getting on the bus. Most animals entered the restrainer when they were patted on the rear end. Since the cattle move through the system in a continuous line, they are never alone and separated from their buddies. At this plant, the system had been beautifully installed and was brightly illuminated. When slaughter is conducted properly, the cattle experience less stress and discomfort than they experience during handling procedures in the veterinary chute.

Being autistic has helped me to understand how they feel, because I know what it is like to feel my heart race when a car horn honks in the middle of the night. I have hyperacute senses and fear responses that may be more like those of a prey-species animal than of most humans. People often fail to observe animals. Recently I visited a slaughter plant where the cattle were terrified of air that hissed from a pneumatically powered gate. Every time the gate opened or closed, the cattle recoiled and backed down the chute. They reacted as if they had seen a

rattlesnake. It was obvious to me that the hissing air scared them, but other people failed to see it. Purchase of a few air silencers solved the problem. With the hissing gone, the animals were no longer afraid of the gate. All it took was a cow's eye view.

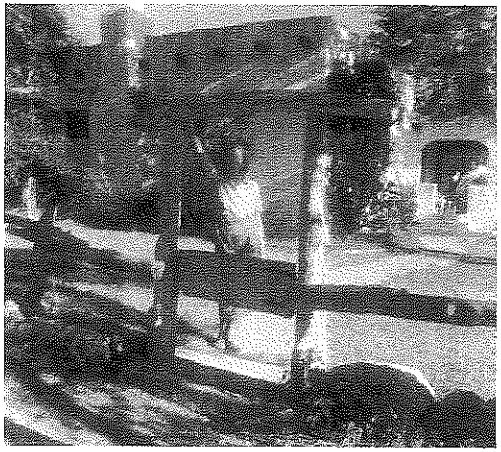
9

Artists and Accountants

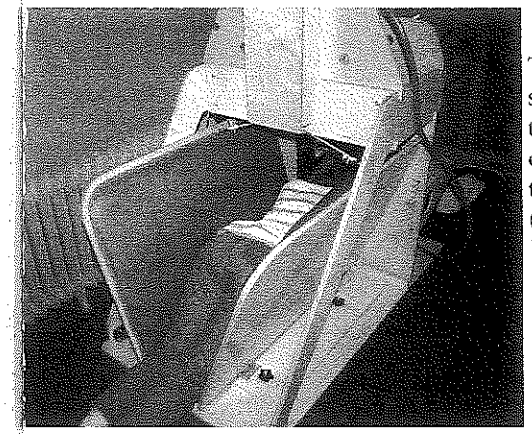
An Understanding of Animal Thought

MANY PEOPLE have been fascinated by the terrific feats of memorization of savants. According to Bernard Rimland, of the Autism Research Institute in San Diego, approximately 9 or 10 percent of people with autism have savant skills. Some are like calendar calculators who can tell you the day of the year for any date; others can perfectly play a piece of music they have heard only once. Another type can memorize every street in a city or every book in a library. There are also savants who can rapidly identify all the prime numbers in a list of numbers, even though they are incapable of doing basic arithmetic calculations. Hans Welling, a researcher in Portugal, speculates that mathematically weak savants may have a method for visually analyzing the symmetry of numbers, which would enable them to distinguish prime from nonprime numbers.

Savants are usually very impaired in learning other skills, such as socializing. One mother told me about her teenage savant son, who could do extraordinary computer programming but simply could not learn the meaning of money. Savants memorize huge amounts of information but have difficulty manipulating the material in meaningful ways. Their

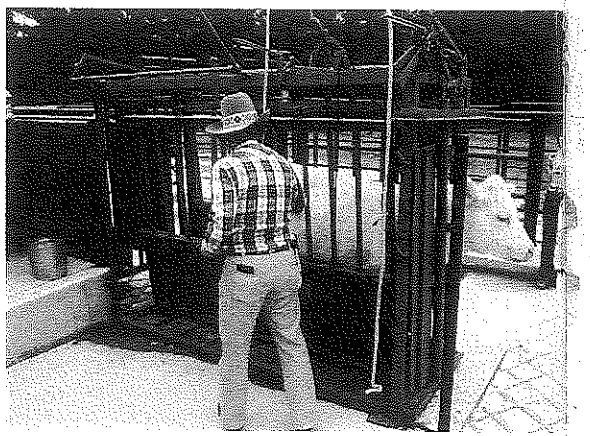


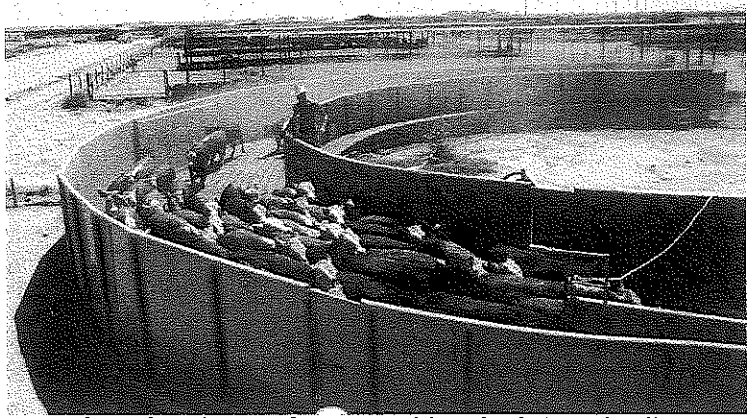
One of my mentors, Aunt Brecheen, helped me channel my fixations. This picture was taken in front of her ranch house in Arizona, where I first observed the cattle chute and made the connection between its calming pressure and my own hyper-aroused nervous system.



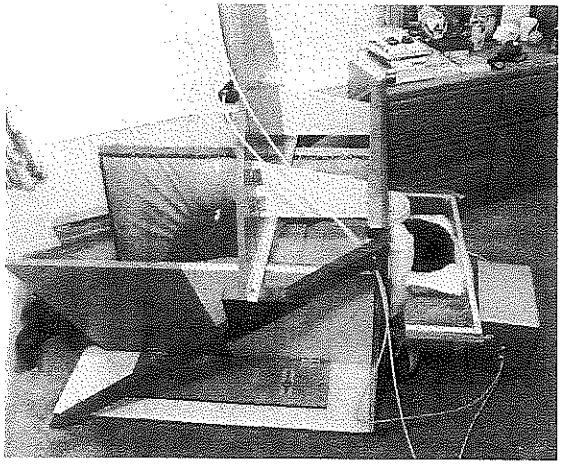
This is a commercially availal squeeze machine manufactured the Therafin Corporation, bas on my design and used in t treatment of people with autis *(Photograph copyright © by Rosa Winard)*

Here is an example of the kind of cattle chute used for holding animals during veterinary procedures. Two panels apply pressure to the animal's body, and its head is restrained by a stanchion closed around its neck.

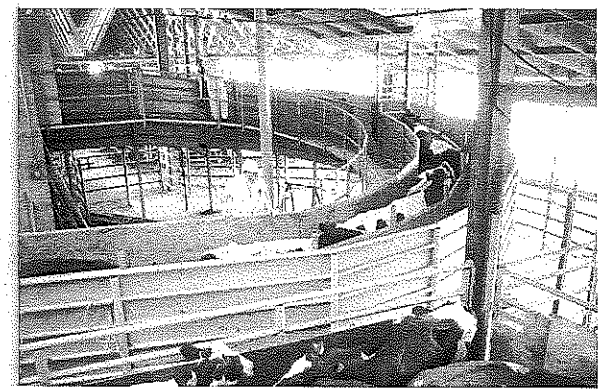




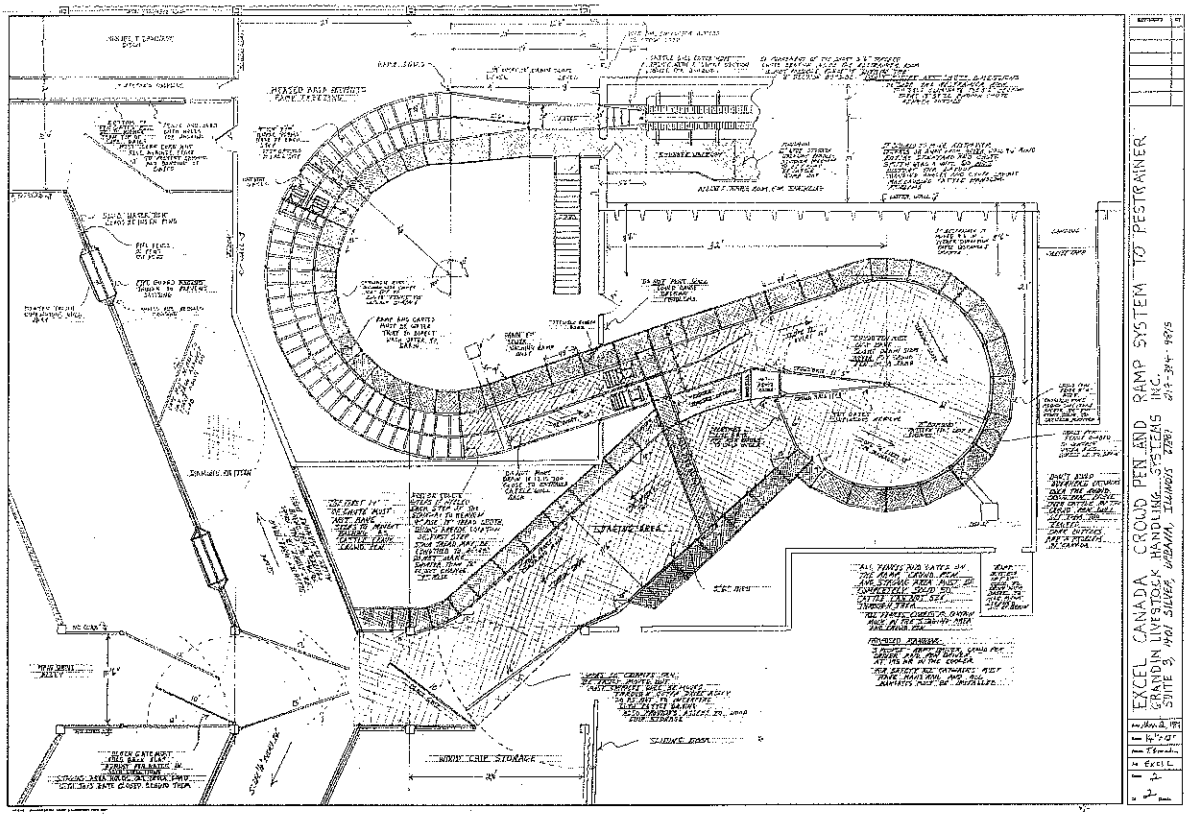
One of my first designs for a curved lane leads into the dip vat at John Wayne's Red River feed yard. I figured out that cattle would move more easily through a curved lane because it makes use of their natural circling behavior.



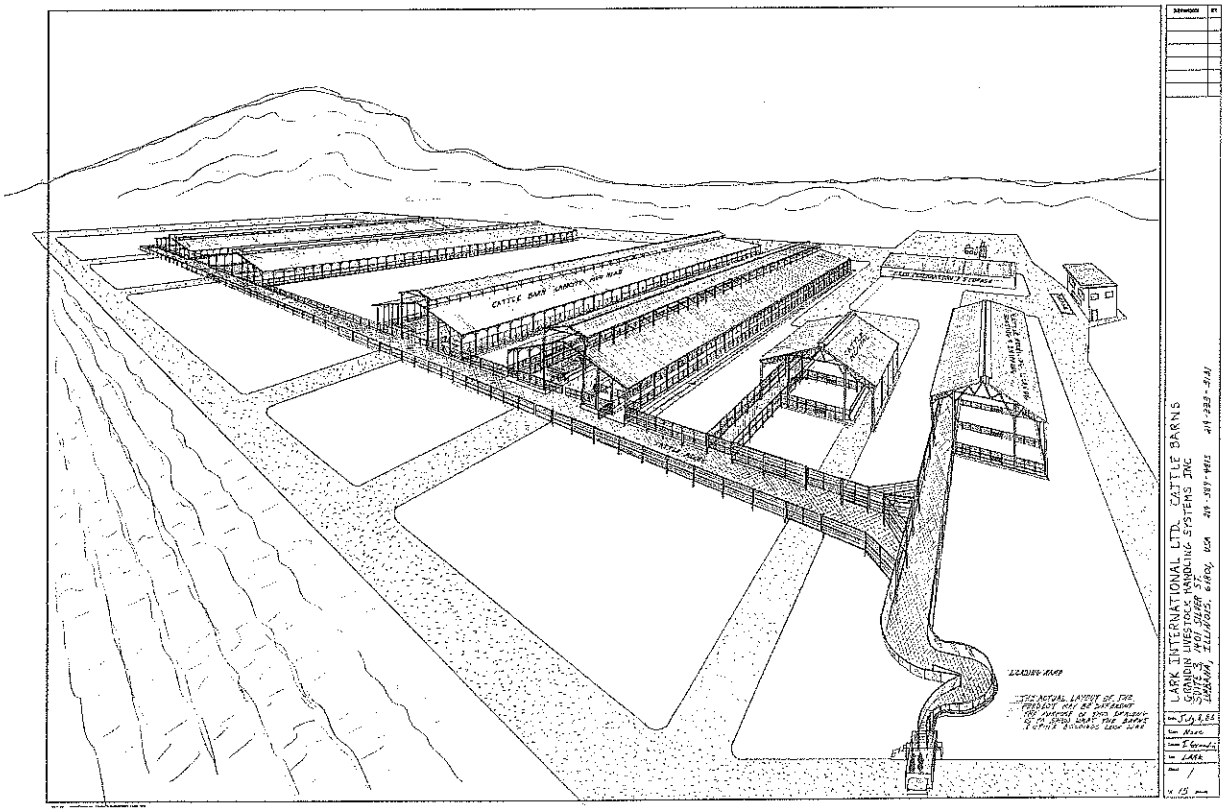
I constructed my first makeshift version of the squeeze machine out of used plywood. Here I am in the current version of the machine, which I also constructed. By manipulating the lever, I can precisely control the amount of pressure applied to my body.



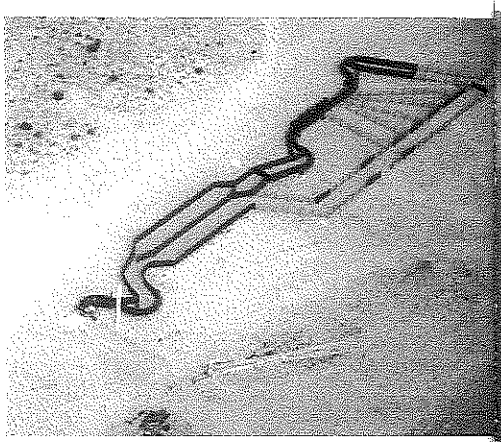
I later applied the curv lane design to syste for meat-packing plan When I designed tl chute, I was able to visu ize the whole system my imagination.

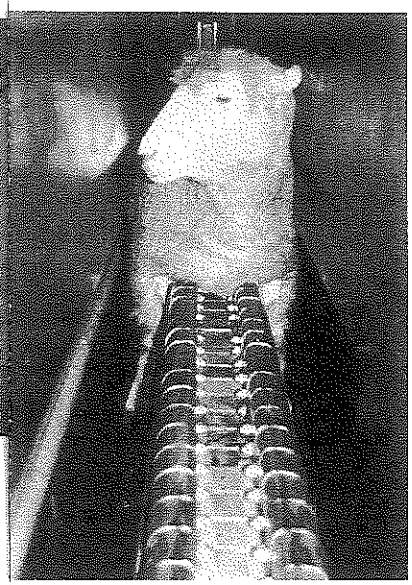


Here is one of my blueprints for a curved chute system. As I draw, I visualize how each part will operate from every angle in my imagination. Many autistics share these intense visualization skills.

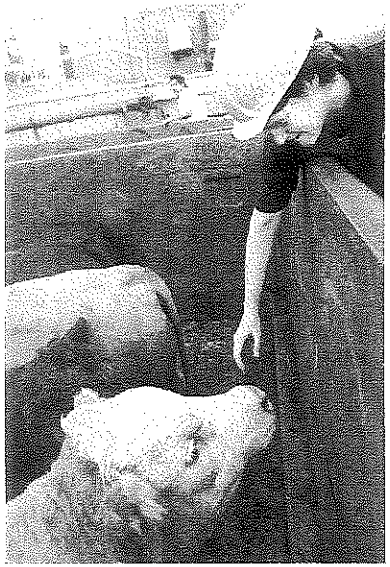


This is an aerial view of my most intricate design, a buffalo handling facility at the Wichita Mountains Wildlife Refuge. It took 26 drawings to complete this facility, which is operated by the U.S. Fish and Wildlife Service.





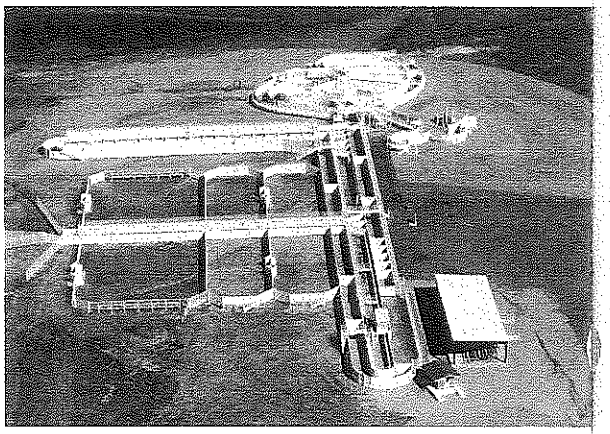
I have designed humane restraint syste for both sheep and cattle. As a result of autism, I have heightened sensory perc tions that help me work out how an ani will feel moving through the system.

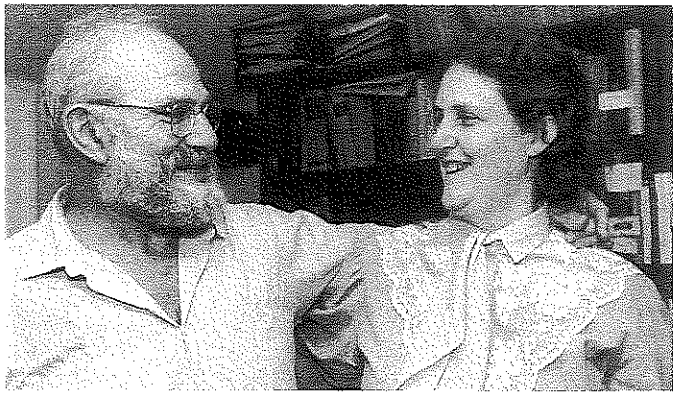


I love nothing more than surveying a plant I've designed where the animals are calm and quiet. One third of the cattle in the United States are moved through handling facilities that I have designed. (*Photograph copyright © by Rosalie Winard*)

In my work on cattle behavior at Colo State University, I sometimes like to g cow's eye view of the situation. (*Photog copyright © by Rosalie Winard*)

I call this my ground sculpture. In fact it is a truck loading and sorting facility in Nevada.





I met Dr. Oliver Sacks when he first wrote about me in *An Anthropologist on Mars*. His groundbreaking descriptions of people with various neurological disabilities have improved our understanding of the often enigmatic workings of the human mind. (*Photograph copyright © by Rosalie Winard*)

case report of naltrexone treatment of self-injury and social withdrawal in autism. *Journal of Autism and Developmental Disorders* 20, 2: 169–176.

Chapter 7 Dating Data: Autism and Relationships

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Chapter 8 A Cow's Eye View: Connecting with Animals

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Chapter 9 Artists and Accountants: An Understanding of Animal Thought

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