1. My Story

People who aren't autistic always ask me about the moment I realized I could understand the way animals think. They think I must have had an epiphany.

But it wasn't like that. It took me a long time to figure out that I see things about animals other people don't. And it wasn't until I was in my forties that I finally realized I had one big advantage over the feedlot owners who were hiring me to manage their animals: being autistic. Autism made school and social life hard, but it made animals easy.

I had no idea I had a special connection to animals when I was little. I liked animals, but I had enough problems just trying to figure out things like why a really small dog isn't a cat. That was a big crisis in my life. All the dogs I knew were pretty big, and I used to sort them by size. Then the neighbors bought a dachshund, and I was totally confused. I kept saying, "How can it be a dog?" I studied and studied that dachshund, trying to figure it out. Finally I realized that the dachshund had the same kind of nose my golden retriever did, and I got it. Dogs have dog noses.

That was pretty much the extent of my expertise when I was five.

I started to fall in love with animals in high school when my mother sent me to a special boarding school for gifted children with emotional problems. Back then they called everything "emotional problems." Mother had to find a place for me because I got kicked out of high school for fighting. I got in fights because kids teased me. They'd call me names, like "Retard," or "Tape recorder."

They called me Tape Recorder because I'd stored up a lot of phrases in my memory and I used them over and over again in every conversation. Plus there were only a few conversations I liked to
have, so that amplified the effect. I especially liked to talk about the rotor ride at the carnival. I would go up to somebody and say, “I went to Nantasket Park and I went on the rotor and I really liked the way it pushed me up against the wall.” Then I would say stuff like, “How did you like it?” and they’d say how they liked it, and then I’d tell the story all over again, start to finish. It was like a loop inside my head, it just ran over and over again. So the kids called me Tape Recorder.

Teasing hurts. The kids would tease me, so I’d get mad and smack ’em. That simple. They always started it, they liked to see me react.

My new school solved that problem. The school had a stable and horses for the kids to ride, and the teachers took away horseback riding privileges if I smacked somebody. After I lost privileges enough times I learned just to cry when somebody did something bad to me. I’d cry, and that would take away the aggression. I still cry when people are mean to me.

Nothing ever happened to the kids who were teasing.

The funny thing about the school was, the horses had emotional problems, too. They had emotional problems because in order to save money the headmaster was buying cheap horses. They’d been marked down because they had gigantic behavior problems. They were pretty, their legs were fine, but emotionally they were a mess. The school had nine horses altogether, and two of them couldn’t be ridden at all. Half the horses in that barn had serious psychological problems. But I didn’t understand that as a fourteen-year-old.

So there we all were up at boarding school, a bunch of emotionally disturbed teenagers living with a bunch of emotionally disturbed animals. There was one horse, Lady, who was a good horse when you rode her in the ring, but on the trail she would go berserk. She would rear, and constantly jump around and prance; you had to hold her back with the bridle or she’d bolt to the barn.

Then there was Beauty. You could ride Beauty, but he had very nasty habits like kicking and biting while you were in the saddle. He would swing his foot up and kick you in the leg or foot, or turn his head around and bite your knee. You had to watch out. Whenever you tried to mount Beauty he kicked and bit—you had both ends coming at you at the same time.
But that was nothing compared to Goldie, who reared and plunged whenever anyone tried to sit on her back. There was no way to ride that horse; it was all you could do just to stay in the saddle. If you did ride her, Goldie would work herself up into an absolute sweat. In five minutes she’d be drenched, dripping wet. It was flop sweat. Pure fear. She was terrified of being ridden.

Goldie was a beautiful horse, though; light brown with a golden mane and tail. She was built like an Arab horse, slender and fine, and had perfect ground manners. You could walk her on a lead, you could groom her, you could do anything you liked and she was perfectly behaved just so long as you didn’t try to ride her. That sounds like an obvious problem for any nervous horse to have, but it can go the other way, too. I’ve known horses where people say, “Yeah you can ride them, but that’s all you can do with them.” That kind of horse is fine with people in the saddle, and nasty to people on the ground.

All the horses at the school had been abused. The lady they bought Goldie from had used a nasty, sharp bit and jerked on it as hard as she could, so Goldie’s tongue was all twisted and deformed. Beauty had been kept locked in a dairy stanchion all day long. I don’t know why. These were badly abused animals; they were very, very messed up.

But I had no understanding of this as a girl. I was never mean to the horses at the school (other kids were sometimes), but I wasn’t any horse-whispering autistic savant, either. I just loved the horses.

I was so wrapped up in them that I spent every spare moment working the barns. I was dedicated to keeping the barn clean, making sure the horses were groomed. One of the high points of my high school career was the day my mom bought me a really nice English bridle and saddle. That was a huge event in my life, because it was mine, but also because the saddles at school were so crummy. We rode on old McClellands, which were honest-to-god cavalry saddles first used in the Civil War. The school’s saddles probably went back to World War II when they still had some horse units in the army. The McClelland was designed with a slot down the center of it to spare the horse’s back. The slot was good for the horse but horrible for the rider. I don’t think there’s ever been a more uncomfort-
able saddle on earth, though I have to say that when I read about the Northern Alliance soldiers in Afghanistan riding on saddles made out of wood, that sounded worse.

Boy did I take care of that saddle. I loved it so much I didn’t even leave it in the tack room where it belonged. I brought it up to my dorm room every day and kept it with me. I bought special saddle soap and leather conditioner from the saddle shop, and I spent hours washing and polishing it.

As happy as I was with the horses at school, my high school years were hard. When I reached adolescence I was hit by a tidal wave of anxiety that never stopped. It was the same level of anxiety I felt later on when I was defending my dissertation in front of my thesis committee, only I felt that way all day long and all night, too. Nothing bad happened to make me so anxious all of a sudden; I think it was just one of my autism genes kicking into high gear. Autism has a lot in common with obsessive-compulsive disorder, which is listed as an anxiety disorder in the Diagnostic and Statistical Manual.

Animals saved me. One summer when I was visiting my aunt, who had a dude ranch in Arizona, I saw a herd of cattle being put through the squeeze chute at a neighboring ranch. A squeeze chute is an apparatus vets use to hold cattle still for their shots by squeezing them so tight they can’t move. The squeeze chute looks like a big V made out of metal bars hinged together at the bottom. When a cow walks into the chute an air compressor closes up the V, which squeezes the cow’s body in place. The rancher has plenty of space for his hands and the hypodermic needle between the metal bars. You can find pictures of them on the Web if you want to see what they look like.

As soon as I caught sight of that thing I made my aunt stop the car so I could get out and watch. I was riveted by the sight of those big animals inside that squeezing machine. You might think cattle would get really scared when all of a sudden this big metal structure clamps together on their bodies, but it’s exactly the opposite. They get really calm. When you think about it, it makes sense, because deep pressure is a calming sensation for just about everyone. That’s one of the reasons a massage feels so good—it’s the deep pressure. The squeeze chute probably gives cattle a feeling like the soothing
sensation newborns have when they’re swaddled, or scuba divers have underwater. They like it.

Watching those cattle calm down, I knew I needed a squeeze chute of my own. When I got back to school that fall, my high school teacher helped me build my own squeeze chute, the size of a human being down on all fours. I bought my own air compressor, and I used plywood boards for the V. It worked beautifully. Whenever I put myself inside my squeeze machine, I felt calmer. I still use it today.

I got through my teenage years thanks to my squeeze machine and my horses. Animals kept me going. I spent every waking minute that I didn’t have to be studying or going to school with those horses. I even rode Lady at a show. It’s hard to imagine today, a school keeping a stable of emotionally disturbed and dangerous horses for its underaged students to ride. These days you can’t even play dodgeball in gym class because somebody might get hurt. But that’s the way it was. A lot of us got nipped or stepped on or thrown at that school, but no one was ever seriously hurt, at least not while I was there. So it worked out.

I wish more kids could ride horses today. People and animals are supposed to be together. We spent quite a long time evolving together, and we used to be partners. Now people are cut off from animals unless they have a dog or a cat.

Horses are especially good for teenagers. I have a psychiatrist friend in Massachusetts who has a lot of teenage patients, and he has a whole different set of expectations for the ones who ride horses. He says that if you take two kids who have the same problem to the same degree of severity, and one of them rides a horse regularly and the other one doesn’t, the rider will end up doing better than the nonrider. For one thing, a horse is a huge responsibility, so any teenage kid who’s looking after a horse is developing good character. But for another, riding a horse isn’t what it looks like: it isn’t a person sitting in a saddle telling the horse what to do by yanking on the reins. Real riding is a lot like ballroom dancing or maybe figure skating in pairs. It’s a relationship.

I remember looking down to make sure my horse was on the right lead. When a horse is cantering around the ring one of his front hooves has to thrust out farther forward than the other one,
and the rider has to help him do that. If I leaned my body just the right way, it helped my horse get on the right lead. My sense of balance was so bad I could never learn to parallel ski no matter how hard I tried, though I did reach the advanced snowplow stage. Yet there I was, moving my body in sync with the horse’s body to help him run right.

Horseback riding was joyous for me. I can remember being on a horse sometimes and we’d gallop in the pasture and that was such a big thrill. Of course it’s not good for horses to run them all the time, but once in a while we’d get to have a little run, and I’d feel exhilarated. Or we’d be out on a trail riding, and do a really fast gallop down the road. I remember what it looked like, the trees whizzing by; I remember that really well to this day.

Riding becomes instinctual after a while; a good rider and his horse are a team. It’s not a one-way relationship, either; it’s not just the human relating to the horse and telling him what to do. Horses are super-sensitive to their riders and are constantly responding to the riders’ needs even without being asked. School horses—the horses a stable uses to teach people how to ride—will actually stop trotting when they feel their rider start to lose his balance. That’s why learning to ride a horse is completely different from learning to ride a bicycle. The horses make sure nobody gets hurt.

The love a teenager gets from a horse is good for him, and so is the teamwork. For years people always said you needed to send difficult kids to military school or the army. A lot of times that works because those places are so highly structured. But it would work a lot better if military schools still had horses.

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*Animals in Translation* comes out of the forty years I’ve spent with animals.

It’s different from any other book I’ve read about animals, mostly because I’m different from every other professional who works with animals. Autistic people can think the way animals think. Of course, we also think the way people think—we aren’t *that* different from normal humans. Autism is a kind of way station on the road from animals to humans, which puts autistic people like me in a perfect
position to translate “animal talk” into English. I can tell people why their animals are doing the things they do.

I think that’s why I was able to become successful in spite of being autistic. Animal behavior was the right field for me, because what I was missing in social understanding I could make up for in understanding animals. Today I’ve published over three hundred scientific papers, my Web site gets five thousand visitors each month, and I give thirty-five lectures on animal management a year. I give another twenty-five or so on autism, so I’m on the road most of the time. Half the cattle in the United States and Canada are handled in humane slaughter systems I’ve designed.

I owe a lot of this to the fact that my brain works differently.

Autism has given me another perspective on animals most professionals don’t have, although a lot of regular people do, which is that animals are smarter than we think. There are plenty of pet owners and animal lovers out there who’ll tell you “little Fluffy can think,” but animal researchers have mostly dismissed this kind of thing as wishful thinking.

But I’ve come to realize that the little old ladies are right. People who love animals, and who spend a lot of time with animals, often start to feel intuitively that there’s more to animals than meets the eye. They just don’t know what it is, or how to describe it.

I stumbled across the answer, or what I think is part of the answer, almost by accident. Because of my own problems, I’ve always followed neuroscientific research on the human brain as closely as I’ve followed my own field. I had to; I’m always looking for answers about how to manage my own life, not just animals’ lives. Following both fields at the same time led me to see a connection between human intelligence and animal intelligence the animal sciences have missed.

The literature on autistic savants sparked my discovery. Autistic savants are people who can do things like tell you what day of the week you were born based on your birth date, or calculate in their heads whether your street address is a prime number or not. They usually have IQs in the mentally retarded range, though not always, yet they can naturally do things no normal human being can even be taught to do, no matter how hard he tries to learn or how much time he spends practicing.
Animals are like autistic savants. In fact, I'd go so far as to say that animals might actually be autistic savants. Animals have special talents normal people don't, the same way autistic people have special talents normal people don't; and at least some animals have special forms of genius normal people don't, the same way some autistic savants have special forms of genius. I think most of the time animal genius probably happens for the same reason autistic genius does: a difference in the brain autistic people share with animals.

The reason we've managed to live with animals all these years without noticing many of their special talents is simple: we can't see those talents. Normal people never have the special talents animals have, so normal people don't know what to look for. Normal people can stare straight at an animal doing something brilliant and have no idea what they're seeing. Animal genius is invisible to the naked eye.

I'm sure I don't know all the talents animals have, either, let alone all the things they could use their talents to do if we gave them the chance. But now that I've seen the connection between autistic savantry and animal genius at least I have an idea what I'm looking for: I'm looking for ways animals can use their amazing ability to perceive things humans can't perceive, and to remember highly detailed information we can't remember, to make life better for everyone, animals and people alike. Just off the top of my head, here's a thought: we have service dogs for the blind—how about service dogs for the middle-aged whose memories are going? I'm willing to bet that just about any dog can remember where you put your car keys better than you can if you're over forty, and probably if you're under forty, too.

Or how about service dogs who remember where your kids left the remote control? I bet a dog could do this if you gave him the training.

Of course, I don't know this for a fact. I could be wrong. But for me, predicting animal talents is getting to be a little like astronomers predicting the existence of a planet nobody can see based on their understanding of gravity. I'm starting to be able to accurately predict animal talents nobody can see based on what I know about autistic talent.
ANIMALS FROM THE OUTSIDE IN

By the time I got to college I knew I wanted to learn about animals.

That was the 1960s, and the whole field of psychology was B. F. Skinner and behaviorism. Dr. Skinner was so famous that just about every college kid in the country had a copy of Beyond Freedom and Dignity on his bookshelf. He taught that all you needed to study was behavior. You weren’t supposed to speculate about what was inside a person’s or an animal’s head because you couldn’t measure all the stuff inside the black box—intelligence, emotions, motives. The black box was off-limits; you couldn’t talk about it. You could measure only behavior, therefore you could study only behavior.¹

For the behaviorists this was no great loss, since, according to them, environment was the only thing that mattered.

Some animal behaviorists took this idea to the extreme by teaching that animals didn’t even have emotions or intelligence. Animals only had behavior, which was shaped by rewards, punishments, and positive and negative reinforcements from the environment.

Rewards and positive reinforcers are the same thing: something good happens to you because of something you did. Punishment and negative reinforcement are opposites. Punishment is when something bad happens to you because of something you did; negative reinforcement is when something bad stops happening to you, or doesn’t start happening to you in the first place, because of something you did. Punishment is bad, and negative reinforcement is good. Punishment makes you stop doing what you’re doing, although a lot of behaviorists believe that punishing a bad behavior isn’t as effective as rewarding a good behavior when it comes to getting an animal to do what you want him to do.

Negative reinforcement is the hardest to understand. Negative reinforcement isn’t a punishment; it’s a reward. But the reward is negative in the sense that something you don’t like either stops or doesn’t start in the first place. Say your four-year-old is screaming and crying and giving you a headache. Finally you lose your patience and blow up at him, and he’s shocked into silence. That’s negative reinforcement, because you’ve made the crying go away, which is what you wanted. Now you’re probably more likely to blow up at

¹
him the next time he starts a tantrum, because you’ve been negatively reinforced for blowing up at him during this tantrum.

Behaviorists thought these basic concepts explained everything about animals, who were basically just stimulus-response machines. It’s probably hard for people to imagine the power this idea had back then. It was almost a religion. To me—to lots of people—B. F. Skinner was a god. He was the god of psychology.

It turned out he wasn’t much of a god in person. I met B. F. Skinner once. I was probably eighteen years old at the time. I’d written him a letter about my squeeze machine, and he’d written me back saying what impressed him was my motivation. Which is kind of funny when you think about it. Here was the god of behaviorism talking about my internal motivation instead of my behavior. I guess he was ahead of his time, since motivation is a hot topic in autism research today.

After I got his letter I called up his office and asked if I could come see him. I wanted to talk to him about some of the research I had done.

His office called and invited me down to Harvard for a visit. It was like going to see the Pope at the Vatican. Dr. Skinner was the most famous professor in all of psychology; he’d been on the cover of *Time* magazine. I was very nervous just about walking up to see him. I remember walking to William James Hall and looking up at the building feeling like “This is the temple of Psychology.”

But when I went into his office, it was a big letdown. He was just a normal-looking man. I remember he had this plant wired up around his office, growing all around the room. We were sitting there talking, and he started asking really personal questions. I don’t remember what they were, because I almost never remember specific words and sentences from conversations. That’s because autistic people think in pictures; we have almost no words running through our heads at all. Just a stream of images. So I don’t remember the verbal details of the questions; I just remember that he asked them.

Then he tried to touch my legs. I was shocked. I wasn’t in a sexy dress, I was in a conservative dress, and that was the last thing I expected. So I said, “You may look at them, but you may not touch them.” I do remember saying that.
We did get to talk about animals and behavior, though, and finally I said to him, “Dr. Skinner, if we could just learn how the brain works.” That’s the other part of the conversation I remember specifically.

He said, “We don’t need to learn about the brain, we have operant conditioning.”

I remember driving back to school going over this in my mind, and finally saying to myself, “I don’t think I believe that.”

I didn’t believe it because I had problems that sure didn’t seem to be coming from my environment. Also, I’d taken an animal ethology class at college—ethologists study animals in their natural environments—and Thomas Evans, the teacher, had taught us about animal instincts, which were hardcoded behavior patterns the animal was born with. Instincts had nothing to do with the environment, they came with the animal.

Dr. Skinner changed his mind when he got old. My friend John Ratey, a psychiatrist at Harvard who wrote the books *Shadow Syndromes* (with my co-author on this book, Catherine Johnson) and *A User’s Guide to the Brain*, told me a story about a lunch he had with Dr. Skinner near the end of his life.³ While they were talking John asked him, “Don’t you think it’s time we got inside the black box?”

Dr. Skinner said, “Ever since my stroke I’ve thought so.”

The brain is pretty powerful, and a person whose brain isn’t working right knows just how powerful. Dr. Skinner had to learn the hard way. His stroke showed him not everything is controlled by the environment. But back in the 1970s, when I was getting started, behaviorism was the law.

I don’t want to sound like the enemy of behaviorism, though, because I’m not. In one way behaviorists weren’t that different from ethologists, because neither group looked inside the animal’s head. Behaviorists looked at animals in laboratory environments; ethologists looked at animals in their natural environment. But both were looking at animals from the outside.

Behaviorists made a big mistake declaring the brain off-limits, but their focus on the environment was a huge step forward and is to this day. Until behaviorism came along, probably no one understood how important the environment is. People still don’t. In the meat-
packing industry, where I’ve worked for thirty years designing humane handling systems, a lot of plant owners don’t think twice about their cattle’s environment. If there’s a problem with the herd, it doesn’t even occur to them to look at the animals’ surroundings to see what’s going on. People want the equipment that I install, but they don’t realize that the equipment won’t work if the environment is bad.

In a plant, the environment means the physical environment, and it also means the way the employees handle the animals. If the animal handling is bad, no amount of top-notch, well-maintained equipment is going to work.

The center-track restraining system I designed, which has been installed in half of all the plants in North America, works only when you have good animal handling. My restraining system is a conveyor belt that goes under the animal’s chest and belly. The animals straddle it lengthwise the same way they would straddle a sawhorse.

The reason plants have adopted my design is that animals are much more willing to walk onto it than they are the old V-shaped restraining systems, so it’s a lot more efficient. That was the only thing wrong with the old restraining systems: the animals didn’t like walking onto them. The V-restrainers work fine, and they don’t hurt the animals, but they squeeze the animal’s feet together, and animals don’t like to walk into a space where they feel like there isn’t enough space for their feet. My design innovation wasn’t technological, it was behavioral. It works better because it respects the animal’s behavior.

But the plants don’t seem to realize that, so naturally they also don’t realize that if they have poor handling of their animals my equipment won’t work. They focus on the equipment.

The other thing I like about behaviorists is that a lot of the time they’re natural-born optimists. In the beginning, behaviorists thought the laws of learning were simple and universal, and all creatures followed them. That’s why B. F. Skinner thought laboratory rats were the only animals anybody needed to look at, because all animals and people learned the same way.

Dr. Skinner’s whole concept of learning was associationist, which meant that positive associations (or rewards) increased behavior, and
negative associations (or punishment) decreased behavior. If you wanted to teach a really complex behavior, all you had to do was break it down into its component parts and teach each little, tiny step separately, giving rewards along the way. That was called task analysis, and it was a huge help not only for animal training (though animal trainers had always done this to some extent), but also for anybody trying to teach children or adults with disabilities. I’ve seen behavioral books for parents that take all the different things a child or adult has to do during the day, like get up, get dressed, eat breakfast, and so on, and break each activity down into its component parts. A supposedly simple thing like getting your clothes on in the morning might involve twenty or thirty different steps or more, and a task analysis lists each one, and you teach each one separately.

Doing a task analysis isn’t as easy as it sounds, because nonhandicapped people aren’t really aware of the very small, separate movements that go into an action like tying your shoe or buttoning your shirt. Typical kids pick these things up pretty easily, so parents don’t have to be especially skilled to teach them how to put their clothes on or tie their shoes. If you’ve ever tried to teach shirt buttoning to a person who has absolutely no clue how to do it, you soon realize that you don’t really know how to do it, either—not in the sense of knowing the sequence of tiny, separate motions that go into successfully buttoning a button. You just do it.

The behaviorists’ belief that any animal or person could learn just about anything if the rewards were right led Ivar Lovaas to his work with autistic children. In his most famous study he took a group of very young autistic kids and gave one half of the children intensive behavior therapy while the other half got much less intensive treatment. Behavior therapy just meant classical operant conditioning, having the kids go over and over the behaviors Dr. Lovaas wanted them to learn and giving them rewards whenever they got something right. He published results showing that half of the kids who got the intensive therapy became “indistinguishable” from normal kids.

There’ve been years of controversy over whether Dr. Lovaas did or didn’t cure anybody, but to me, the fact that he brought those kids so far there could be an argument about it is what matters. Behaviorism gave parents and teachers a reason to think that autistic
people were capable of a lot more than anybody thought, and that was a good thing.

The other major contribution behaviorists made is that they were, and still are today, fantastically close observers of animal and human behavior. They could spot tiny changes in an animal’s behavior quickly, and connect the changes to something in the environment. That’s one of my own most important talents with animals.

So for all of its problems, behaviorism had a lot to offer, and still does. Besides, the animal ethologists had their blind spots, too. For instance, both the ethologists and the behaviorists were in total agreement that practically the worst thing anyone could possibly do was to anthropomorphize an animal. Ethologists and behaviorists probably had different reasons for being against anthropomorphism—Dr. Skinner thought it was just as bad to anthropomorphize a person as an animal—but whatever the reasons, they agreed. Anthropomorphizing an animal was wrong.

To a large degree they were right to stress this, because humans just naturally treat their pets as if they’re four-legged people a lot of the time. Professional trainers are constantly telling people not to assume their pets think and feel the same way they do, but people keep on doing it anyway. The dog trainer John Ross even has a story in his book *Dog Talk* about the first time he realized he was being anthropomorphic, and he’s a professional. He had an Irish setter named Jason who was a big “garbage dog,” constantly getting into the garbage whenever Mr. Ross wasn’t around. Mr. Ross figured Jason knew he was being bad because if there was a mess on the floor the dog would take off running the minute Mr. Ross got home. On days when he hadn’t gotten into the garbage he didn’t run, so Mr. Ross thought this meant Jason knew that strewing garbage clear across the kitchen was wrong, and ran away because he felt bad.

He found out differently when a more experienced trainer had him try an experiment. He told Mr. Ross to go get into the garbage *himself*; when Jason wasn’t watching, and dump it out all over the floor. Then he was supposed to bring Jason into the kitchen and see what the dog did.

It turned out Jason did what he always did when there was
garbage on the floor—he took off running. He wasn’t running away because he felt guilty, he was running away because he felt scared. For Jason, garbage on the floor meant trouble. If Mr. Ross had stuck to behaviorist principles and thought about Jason’s environment instead of about his “psychology,” he wouldn’t have made this mistake. 

A friend of mine had the same experience with her two dogs, a one-year-old German shepherd and a three-month-old golden retriever. One day the puppy pooped in the living room, and later on when the older dog saw the poop she got so anxious she started to drool. If the older dog had made the poop herself and then stood there drooling, her owner probably would have thought the dog knew she’d done something bad. But since the other dog had made the poop, her owner realized that the whole category of poop-on-living-room-floor was just plain bad news, period.

Those stories are classic examples of why it’s not a good idea to anthropomorphize an animal, but that’s not all there is to it. In my student days, even though everyone was against anthropomorphizing animals, I still believed it was important to think about the animal’s point of view. I remember there was a great animal psychologist out of New Zealand named Ron Kilgour (he was an ethologist) who wrote a lot about the problem of anthropomorphizing. One of his early papers told a story about a person who had a pet lion he was shipping on an airplane. Someone thought the lion might like to have a pillow for the trip, the same way people do, so they gave him one, and the lion ate it and died. The point was: don’t be anthropomorphic. It’s dangerous to the animal.

But when I read this story I said to myself, “Well, no, he doesn’t want a pillow, he wants something soft to lie on, like leaves and grass.” I wasn’t looking at the lion as a person, but as a lion. At least that’s what I was trying to do.

That kind of thinking was illegal for behaviorists, however, and wasn’t really encouraged by the ethologists, either. Both groups were environmentalists when you came right down to it, the big difference being which environment the animal was in while the researchers were studying him.

In the end, I had a pretty good grounding in animal ethology
from undergraduate college before I started graduate school at Arizona State University. It was a good thing I did, because Arizona State was a hotbed of behaviorism. Everything was behaviorism. And I did not like some of the very cruel experiments they did to mice, rats, and monkeys. I remember one poor little monkey that had a little Plexiglas thing shoved onto his scrotum that they were shocking him with. I thought that was terrible.

I was not involved in any of the nasty experiments. I don’t endorse using animals as subjects in experiments unless you’re going to learn something incredibly important. If you’re using animals to find a cure for cancer, that’s different, especially since animals need a cure for cancer, too. But that’s not what they were doing at Arizona. I spent one year in the psych department studying experimental psychology, and I thought, “I don’t want to do this.”

Even if the experiments had been fun for the animals, I still didn’t see the point. My question was, “What are you learning from this?” Dr. Skinner wrote a lot about schedules of reinforcement, which is how often and how consistently the animal receives a reward for a particular behavior, and they were running every different schedule of reinforcement they could think of. Variable reinforcement, intermittent reinforcement, delayed reinforcement; you name it, they were running it.

It was totally artificial. What animals do in labs is nothing like what they do in the wild—so what are you actually learning when you do these experiments? You’re learning how animals behave in labs. Finally people started doing things like letting a bunch of lab rats out in a courtyard and watching what they did. Suddenly the rats started developing complex behaviors no one had ever seen before.

**Seeing the Way Animals See:**
**The Visual Environment**

The only research I was interested in doing at Arizona State was studying visual illusions in animals. I’m sure I was interested in visual illusions because I’m a visual thinker. I didn’t know it at the time, but being a visual thinker was the start of my career with animals. It
gave me an important perspective other students and professors didn’t have, because animals are visual creatures, too. Animals are controlled by what they see.

When I say I’m a visual thinker I don’t mean just that I’m good at making architectural drawings and designs, or that I can design my cattle-restraining systems in my head. I actually think in pictures. During my thinking process I have no words in my head at all, just pictures.

That’s true no matter what subject I’m thinking about. For instance, if you say the word “macroeconomics” to me I get a picture of those macramé flowerpot holders people used to hang from their ceilings. That’s why I can’t understand economics or algebra; I can’t picture it accurately in my mind. I flunked algebra. But other times thinking in pictures is an advantage. During the 1990s I knew all the dot-coms would go to hell, because when I thought about them the only images I saw were rented office space and computers that would be obsolete in two years. There wasn’t anything real I could picture; the companies had no hard assets. My stockbroker asked me how I knew the two stock market crashes would happen, and I told him, “When the Monopoly play money starts jerking around the real money you’re in trouble.”

If I’m thinking about a structure I’m working on, all of my judgments and decisions about it happen in pictures. I see images of my design going together smoothly, images of problems and sticking points, or images of the whole thing collapsing if there’s a major design flaw.

That’s the point where words come in, after I’ve finished thinking it through. Then I’ll say something like, “That won’t work because it will collapse.” My final judgment comes out in words, but not the process that led up to the judgment. If you think about a judge and jury, all my deliberations are in pictures, and only my final verdict is in words.

If I’m alone I’ll say the verdict out loud, though I don’t do it with other people around because I know I’m not supposed to. In college I did a lot of talking out loud because it helped me organize my thinking. A lot of autistic people talk out loud for the same reason. I’ll also do some extremely simple running commentary in
words. I’ll say, “Let’s try this,” or, “Oh boy! I figured it out.” The language is always simple. It’s the pictures that are complex.

When I talk to other people I translate my pictures into stock phrases or sentences I have “on tape” inside my head. Those kids who called me Tape Recorder were right about me. They were mean, but they were right. I am a tape recorder. That’s how I’m able to talk. The reason I don’t sound like a tape recorder anymore is that I have so many stock phrases and sentences I can move around into new combinations. All my public speaking has been a huge help. When I got criticisms saying I always gave the same speech, I started moving my slides around. That moved my phrases around, too.

When I was young I had no idea that being a visual thinker made me different from anyone else. I thought everyone saw pictures inside their heads. So naturally, when I didn’t like the lab work I was doing and wanted to start learning about animals in their natural environments, I focused on the visual environment. It wasn’t a conscious decision, it was just what I naturally gravitated to.

Being verbal thinkers, behaviorists hadn’t really thought about the visual environment. When they talked about the environment rewarding or punishing an animal in response to something it did, they usually meant food and electric shocks. That made sense for a Skinner box, where there’s nothing much to look at, and if you mess up you get a shock. (A Skinner box was a special cage, usually a Plexiglas box, behaviorists used to test and analyze a rat’s behavior. There was nothing in it except a lever and maybe some indicator lights that went on or off when a reward was available.) Most Skinner boxes didn’t shock the animals, but if punishment was part of the experiment, usually the punishment would be a shock.

In the wild, though, there aren’t any electric shocks, and you can’t get food by pecking a lever. You get food by being highly attuned to the visual environment. Behaviorists finally started to catch on to the importance of vision to an animal when somebody did a famous experiment showing you could teach a monkey how to push a lever just by letting him look outside a window every time he hit the lever. They didn’t need to give the monkey a food reward, just a view. Animals need to see, and they want to see.
While I was doing my research on visual illusions in the lab I started to hang out in feed yards with the cattle, where I noticed that a lot of times the animals didn’t want to go through the chutes, which are the narrow passageways the cattle go through on the way to the squeeze chute. When I saw cattle balking and acting scared I just naturally thought, “Well let’s look at it from the animal’s point of view. I’ve got to get in the chute and see what he’s seeing.”

So I took pictures inside the chutes from the cattle’s point of view. I even put black-and-white film in my camera because we thought animals saw in black and white. (Later on we learned that they see colors, too, but not in as wide a spectrum as we do.) I wanted to see what they were seeing.

That’s when I noticed that simple things, like shadows or chains hanging down, made the animals balk.

The people at the feed yards thought my whole project was ridiculous. They couldn’t imagine why I’d get in there and try to see what the cattle were seeing. Now I realize that in my own way I was being just as anthropomorphic as those people who gave the lion the pillow. Since I was a visual thinker I assumed cows were, too. The difference was I happened to be right.

When you’re trying to understand how the environment is affecting an animal’s behavior, you have to look at what the animal is seeing. I remember one time I went to a plant where they had a yellow metal ladder on a wall inside a building. The cattle had to go by it when they walked through a narrow alley. Those cattle just would not walk by that ladder. They’d plant their feet on the ground and refuse to move. Finally one of the yard people figured out the problem. He painted the ladder gray, and everything was fine. I work with management and with the employees down on the floor or in the yard, and I’ve found that a lot of times the guys in the yard are better at understanding animals than management.

If a cow sees a yellow raincoat flapping on a fence, she’s in a panic. But if you aren’t a visual thinker, it can be hard to even notice that yellow raincoat flapping on the fence. It doesn’t jump out at normal people the way it does at me or at a cow.

Since I didn’t realize other people thought in words instead of pictures, for a long time I could never figure out why so many ani-
mal handlers made such obvious, elementary mistakes. Not all of
them do; I’ve met lots of good animal handlers in the meatpacking
industry. But I was always surprised when I found an animal profes-
sional doing something that was just plain dumb. Why couldn’t they
see what they were doing wrong?
I remember one situation in particular, where the owner of a
cattle-handling facility hired me as a last resort before they tore the
whole place down and built it back up from the ground. He called
me because his cattle wouldn’t walk inside the narrow passage lead-
ing to the squeeze chute.
The problem wasn’t that the cattle were afraid of getting their
shots. Most cattle don’t even know they’re going to be getting shots
inside the chute. Besides, a lot of animals barely feel their shots any-
way. New dog owners are always surprised by this. They’ll watch
their dog cower and cringe as the vet examines him, then not blink
an eye when he sticks him with a needle. Some vets say that’s the
difference between a dog, who isn’t anticipating pain, and a person,
who is. Thinking about a shot makes it worse.
The problem at the cattle-handling facility had to be something
they were doing wrong, since those cattle were perfectly fine before
they got there. But the owner couldn’t figure it out. He needed to
fix the situation fast, too, because skipping vaccinations isn’t an
option. Cattle aren’t like children, who get vaccinated against a lot
of diseases like polio or whooping cough that are pretty hard to
catch nowadays. Cattle are extremely susceptible to bovine viral diar-
rhea and to respiratory diseases like pneumonia. If they don’t get
their shots, infectious disease will sweep through the herd and kill
10 percent of the animals. So you have to vaccinate, and in order to
vaccinate you have to have your cattle walk into the squeeze chute.
These cattle wouldn’t do it, and the owner was starting to panic.
Things had gotten so bad the handlers were using cattle prods,
which are fiberglass rods with two prongs on the end that deliver an
electric shock to an animal. Prods will get an animal moving, but
they’re stupid things to use because they can panic the animals and
make them rear up, which is dangerous for the workers. Prods
always stress an animal, and when an animal is stressed his immune
system goes down and he starts getting sick, which means higher
veterinary bills. Plus stressed animals gain less weight, which means less meat to sell. Dairy cattle who’ve been handled with prods give less milk.

Stress is bad for human growth, too, although most people don’t realize it. The one thing people do know about is failure to thrive, when children who’ve been badly abused or neglected suffer stress dwarfism. The child’s biology is normal and he’s eating enough food, but he doesn’t grow. Stress dwarfism is pretty rare, but there’s evidence that stressed children, just like stressed animals, can grow more slowly than calmer children. Researchers have known for quite a while that anxious adults often have low levels of growth hormone, and a study in 1997 found that anxious girls, though not anxious boys, were more likely to be short than calm girls.

My guess is that eventually we’ll find out anxious boys are smaller, too. Anxious male animals are smaller than calm male animals, and I don’t see any reason why human males should be different. I think the German orphanage story probably tells us stress is bad for boys, too. That’s the famous case of two orphanages in postwar Germany where one was run by a nice headmistress, while a mean lady who made fun of the children in front of their friends ran the other. She was nice only to the eight children who were her special favorites.

None of the children had enough food, and all of them were smaller than they were supposed to be. Then a natural experiment happened when the government gave the children living with the nice lady extra rations—at the very same moment that the nice lady quit her job and left, and the mean lady was hired in her place. The eight teacher’s pets moved to the new orphanage with the mean director. Doctors were measuring all the children’s growth, and they found that even though the children in the first orphanage were getting extra food, now that they were stressed by a nasty adult they didn’t grow as well as the children in the other orphanage. They had more food but grew less. The eight favorites grew better than anyone. Both orphanages had boys as well as girls, so I assume the boys’ growth was slowed by stress, too.

With animals there’s no ambiguity: stress is horrible for growth, period, which means stress is horrible for profits. So even a feedlot owner who doesn’t care about an animal’s feelings doesn’t like using prods, because a stressed animal means financial loss.
When I got to the feedlot it took me about ten minutes to figure out the problem.

To get to the squeeze chute, first the animals had to walk inside the barn door into a round holding area called a crowd pen. That part of the procedure went off without a hitch. The cattle didn’t have any problem stepping inside the pen.

Next they were supposed to walk into a curved single-file alley (it’s also called a chute) that led to the squeeze chute. That was where the cattle balked. They just would not walk into the alley. It was the exact same alley feedlots all over the world were using without any trouble, so no one could figure out what the problem was. They couldn’t see anything about their setup that was different from any other setup.

But to me it was obvious: the alley was too dark. The cattle were supposed to walk from broad daylight into an unlit indoor alley, and the contrast in illumination was too sharp. They were afraid to walk into pitch-black space.

That might seem a little surprising, since prey animals, like cattle, deer, and horses, usually like the dark. They can hide in the dark and feel safe, or at least safer than they feel during the day. But the problem wasn’t the dark, it was the contrast of going from bright sunlight to a dark interior. Animals never like going from bright to dark. They don’t like any kind of experience that temporarily blinds them, and that includes looking into a bright light when they’re standing in relative darkness. I’ve found that cattle won’t even walk toward a glaring lightbulb. You have to use indirect lighting at the mouth of an alley to make it work.

As soon as I saw the setup I figured that was the problem, and I confirmed my guess when I asked the owner how the cattle behaved at different times of the day, and in different kinds of weather. When he thought about it, he realized that the facility worked fine at night. Things weren’t too bad on cloudy days, either. It was the bright, sunny days that were impossible, but no one had noticed the pattern.

I think a number of things are at work when an animal reacts that way. Cattle have excellent night vision and are used to seeing well in the dark, unlike people. So the experience of going temporarily
blind in the seconds before their irises expand, which is something people take for granted, probably makes them panic. Also, cows don’t live in houses with electricity and drive around in cars at night the way we do, so they don’t develop a mental category called “eyes adjusting to an abrupt change in illumination.” Last but not least, animals are so intensely sensitive to the visual world that I wouldn’t be surprised to find out that sudden huge changes in illumination are physically painful in some way. People don’t enjoy the experience of moving from brilliant light to a dark room, either, but for a cow it must be overwhelming.

Maybe when those cattle started to walk out of the sun into the chute they felt like they were going blind for real. They might have been having the same reaction you or I would have if we were driving down the street and suddenly went blind every time we drove through an underpass. If you went blind every time you drove through an underpass you wouldn’t drive through underpasses.

I always tell people: whenever you’re having a problem with an animal, try to see what the animal is seeing and experience what the animal is experiencing. There are lots of things that can upset an animal—smells, changes in routine, exposure to things he hasn’t experienced before—and you should consider all of them. Anything in the sensory realm can upset an animal. But don’t forget to ask yourself what your dog, cat, horse, or cow may be seeing that’s bothering him.

At that feedlot, all they needed to do was get more light inside the barn. They could have fixed the problem themselves in five minutes if they’d been able to think about the chute from the animal’s point of view. The answer was right in front of them. I really do mean directly in front of them, because the people who built the barn in the first place had installed a big sliding garage door on the front of the barn that the owner had left closed.

When I told him all they needed to do was open the door, it turned out that it hadn’t been opened once since the lot was built. They didn’t even know if they could open it after all this time. But they got a couple of guys to put their shoulders up against the door, and after a few minutes of straining and grunting they got the thing open. That was the end of the problem. The cows all walked into the chute just as nice as could be.
WHAT PEOPLE SEE AND DON'T SEE

That feedlot consultation was the kind of thing that started to give me a reputation for having practically a magical connection to animals. Meanwhile I was always mystified by these situations, because to me the answers seemed so obvious. Why couldn’t other people see what the matter was?

It took me fifteen years to figure out that other people actually couldn’t see what the problem was, at least not without a lot of training and practice. They couldn’t see it because they weren’t visually oriented the way animals and autistic people are.

I always find it kind of funny that normal people are always saying autistic children “live in their own little world.” When you work with animals for a while you start to realize you can say the same thing about normal people. There’s a great big, beautiful world out there that a lot of normal folks are just barely taking in. It’s like dogs hearing a whole register of sound we can’t. Autistic people and animals are seeing a whole register of the visual world normal people can’t, or don’t.

I don’t just mean this metaphorically, either. Normal people literally don’t see a lot of things. There’s a famous experiment by a psychologist named Daniel Simons, head of the Visual Cognition Lab at the University of Illinois, called Gorillas in Our Midst, that shows you how bad people’s visual awareness is. In the experiment they show people a videotape of a basketball game and ask them to count how many passes one team makes. Then, a little while into the tape, while everyone is sitting there counting passes, a woman wearing a gorilla suit walks onto the screen, stops, turns, faces the camera, and beats her fists on her chest.

Fifty percent of all people who watch this video don’t see the gorilla!

Even when experimenters ask them directly, “Did you notice the gorilla?” they say, “The what?” It’s not that they don’t remember the lady in the gorilla suit. Anyone who’s forgotten something he saw will remember it when you give him a prompt. These folks actually didn’t see the lady gorilla in the first place. She didn’t register.

The experimenters tested out their theory with another video in
which an actor suddenly changes into a whole different person, wearing a completely different set of clothes. Seventy percent of normal people don’t notice that, either. They also don’t notice it in real life. In one study a blond-haired man wearing a yellow shirt handed students a form to fill out, then took the completed form behind a bookcase to file. When he came back out he was a dark-haired man wearing a blue shirt. He wasn’t the same guy in disguise; he was a whole different person. It didn’t matter. Seventy-five percent of the students had no idea they’d just interacted with two different people.

The scariest study, though, was the one NASA did with commercial airplane pilots. The researchers put them in a flight simulator and asked them to do a bunch of routine landings. But on some of the landing approaches the experimenters added the image of a large commercial airplane parked on the runway, something a pilot would never see in real life (at least, let’s hope not). One quarter of the pilots landed right on top of the airplane. They never saw it.

I’ve seen photographs from the study, and what’s interesting is that if you’re not a pilot, the parked plane is obvious. You can’t miss it, and you don’t have to be autistic to see it, either. I’d bet the ranch that the only people who could possibly miss that plane would have to be commercial pilots. If you’re a professional, expecting to see what a professional normally would see, there’s a 25 percent chance you’ll miss a huge commercial aircraft parked crossways blocking the landing strip in a flight simulator.

That’s because normal people’s perceptual systems are built to see what they’re used to seeing. If they’re used to seeing gorillas in the middle of basketball games, they see gorillas. If they’re not used to seeing gorillas in the middle of basketball games, they don’t. They have inattentional blindness.

I have no idea how a visual thinker would do on these experiments, but my guess is visual thinkers would see the gorilla a lot more often than verbal thinkers. I’m almost positive there’s no prey animal on earth who would miss that gorilla, that’s for sure, though I think predators would see the gorilla, too. A predator, by the way, is an animal like a dog or a cat who hunts and kills other animals for food; a prey animal is the animal the predator hunts. There’s also another category of animals you don’t hear about as much, which is
the scavenger animals (like vultures) who do eat meat but don’t kill the animals they eat. All animals, including human beings, fall into at least one of these categories, and quite a few—including a lot of primates—belong to more than one. Humans are more predators than prey, but we share qualities with both. In terms of the size of our teeth, we’re defenseless, but as soon as we developed tools we became predators.

It’s so hard for normal people to see what scares cattle that I finally developed a checklist of mostly visual details for plant managers to look out for. Things like pieces of metal that wiggle, reflections on water, bright spots, contrasts of color, and air hissing or blowing in their faces. I tell the owners, if you have three “bad” details you have to correct all three. Then your animal will walk up the chute without any trouble and you can throw away your electric prod.

Visual thinkers of any species, animal or human, are detail-oriented. They see everything and they react to everything. We don’t know why this is true, we just know from experience that it is. I’ve had interior designers tell me, “I see everything.” The worst thing that can happen to an interior designer is to work with a sloppy contractor. The designer will see every little flaw in the contractor’s work. Tiny mistakes no one else even notices, like grout that’s slightly uneven, will jump out at visual people. They go crazy. Visual people feel horrible when little details in their visual environments are wrong, the same way animals do.

I think this is probably the hardest part of an animal’s existence for normal people to relate to. Verbal people can’t just turn themselves into visual people because they want to, and vice versa.

I hope this book will help regular people be a little less verbal and a little more visual. I’ve spent thirty years as an animal scientist, and I’ve spent my whole life as an autistic person. I hope what I’ve learned will help people start over again with animals (and maybe with autistic people, too), and begin to think about them in a different way.

I hope what I’ve learned will help people see.