Tease
The Dog Nose Knows
Virtual Dog Training
Entertaining Parrots
The Bite Stuff

TEASE

ALAN ALDA I just learned how to get Tug here to obey my commands. Now let's see how I do with a virtual dog. Jump.

BRUCE BLUMBERG Cool.

ALAN ALDA He got it, he got it.

BRUCE BLUMBERG Do it again. Do it again.

ALAN ALDA (NARRATION) From real dog noses… to an artificial one.

MACHINE Land mine.

ALAN ALDA Wow, pretty smart.

ALAN ALDA (NARRATION) And from high-tech toys for lonely parrots…

ALAN ALDA We give parrots what they want.

ALAN ALDA (NARRATION) To an Internet hook-up for stay-at-home dogs, we take a close-up look at pets and technology.

ALAN ALDA I'm Alan Alda. Join me and Tuggy here for a show we call Pet Tech.

THE DOG NOSE KNOWS

ALAN ALDA (NARRATION) As the women's basketball squad scrimmages at Auburn University in Alabama, no one seems to pay much attention to a lone figure placing a harmless-looking tube under one of the seats. But one person watching with keen interest is Ed Hawkinson. An ex Secret Service agent, he

helped protect the president using dogs trained to sniff out explosives. Today he's watching the performance of a dog named Booger.

ED HAWKINSON This dog actually sniffs around four times a second, which is pretty remarkable, and he inhales odor until he goes right straight to the source, puts his nose on it and then sits. He's just pretty steady sniffing right now.

ALAN ALDA (NARRATION) Ed's skill is in training dogs to locate specific scents they've learned to associate with a reward.

ED HAWKINSON Now see, see the change in the behavior? Now what he did was tell her it's somewhere in that area. Now he's going to raise his head up in a minute and sit down.

HANDLER Good boy.

ED HAWKINSON There's nothing more beautiful than watching a dog do this and go right to the source and then sit.

ALAN ALDA (NARRATION) The scent Booger's rewarded for finding this time was a harmless chemical. But he's also been trained to sniff out far more dangerous things.

ED HAWKINSON It's a polymer gun, it's a real gun, it has real bullets in it -- none in the chamber -- and what we do is just teach the dog to find the bouquet of odors that are actually coming off this gun.

ALAN ALDA (NARRATION) Ed Hawkinson's new job is to breed and train dogs to help prevent tragedies like the shootings at Columbine High.

ED HAWKINSON We can't take care of the psychological problems that's causing all this, but maybe we can prevent people from bringing guns and bombs to school because of the dogs that we're gonna have here.

ALAN ALDA (NARRATION) These Labrador puppies are among Ed's first recruits. He favors labs in part because they're so appealing.

ED HAWKINSON They're certainly lovable animals and they're not a threat to anybody. But they absolutely smell great as far as their olfactory capabilities. They're very calm dogs and we just love 'em because of their temperament. You take these into schools and you have no problem communicating with the children and the administrators and all that. There's not a threat. 'Course, this one here is the worst one. You're the star of the show.

ALAN ALDA (NARRATION) Ed's puppies have months of training ahead of them before they become as expert as Sadie, a black lab who specializes in detecting the explosive TNT. TRISH This contains 45 grams of flaked TNT. This is what Sadie is trained to smell and then sit.

ALAN ALDA (NARRATION) Each of the blocks in the circle has a jar in it. The jars all contain a chemical, but in only four is the chemical TNT. Watching her performance are two visitors to Auburn from Tufts University in Massachusetts, John Kauer and Joel White. John and Joel have taken on the daunting task of trying to emulate Sadie's skills with a device that looks like a Rube Goldberg variation on a vacuum cleaner. Their goal is to use it to locate some of the deadliest objects in the world -- unexploded land mines. To show how hard the task is now, John has buried a land mine -- emptied of its explosive -- just below the surface in his back yard. My job is to find it, armed only with this wooden stick.

JOHN KAUER Of course, the idea is to stick it in obliquely so that you don't…

ALAN ALDA You don't want to go down on it because that's where the fuse is. You know, when I was in the army 40 years ago they taught me how to do that with a bayonet, to crawl on the ground and probe for it. That was one of many things they taught me in the army that I didn't really want to know.

ALAN ALDA (NARRATION) I only have to search around in one small spot of freshly turned earth.

ALAN ALDA Is this enough of an angle do you think?

JOHN KAUER I think that's the appropriate angle.

ALAN ALDA (NARRATION) It's frustrating -- and scary.

JOHN KAUER So you can see from doing this how long it would take to clear a square meter, for example.

ALAN ALDA I mean, obviously somebody experienced at it would go a lot faster than I'm going, but you do have to make many…

JOHN KAUER Well, I'm not sure they would go a lot faster.

ALAN ALDA (NARRATION) After several very long minutes of blindly probing…

ALAN ALDA Ok, there it is.

JOHN KAUER Got something?

ALAN ALDA Yeah, that's clearly it. But I'll tell you I think I would have already blown myself up.

ALAN ALDA (NARRATION) The only way to confirm it's the mine is to gently -- very gently -- clear away the dirt with my fingers.

ALAN ALDA There it is. Oh my god, what a horrible sight. That little bit of green plastic in there. What a disgusting sight that is.

JOHN KAUER That's the essence of the problem right there.

ALAN ALDA (NARRATION) And the problem is immense. It's estimated that there are between 50 and 100 million land mine buried in places as far apart as Bosnia, Afghanistan and Cambodia. Like the mine I searched for, most of them are plastic and so invisible to metal detectors. The only way to find them -- apart from probing -- is to use dogs.

ALAN ALDA How effective are dogs compared to probing?

JOHN KAUER Well, it's a good question. The dogs are not perfect. They don't find every land mine that's out there. And the problem probably stems from the fact that the concentrations of the material you're trying to detect are extremely low. These have very little odor associated with them. You won't smell, you and I won't smell anything and even if we opened them we wouldn't smell the material.

ALAN ALDA (NARRATION) So for several years now, working mostly in John Kauer's garage, the two biologists have been building an artificial nose they hope will one day be even better than a dog's.

JOEL WHITE Now if we do this right, it won't start smoking when we get this all hooked up. John and I are neurophysiologists, we're interested in how the brain works. And traditionally neurophysiologists tend to be people who like to tinker with things, build electronic circuits, you program computers, you make your own hardware, you build your amplifier. And so it was kind of natural that when the idea of building an artificial nose came up that that was something that would be attractive to us.

ALAN ALDA (NARRATION) The artificial dog nose consists of a battery pack, a computer and the device actually takes the sniffs.

JOHN KAUER You're the first person not in the lab who has worn this thing.

ALAN ALDA Hope it doesn't blow up.

JOEL WHITE If blue smoke starts coming out of it we'll run.

ALAN ALDA (NARRATION) The tube first takes a sniff at an empty jar.

MACHINE Blank

ALAN ALDA That wasn't me. That was the machine, It has my voice. "Blank."

ALAN ALDA (NARRATION) The next jar contains DNT, a non-explosive cousin to TNT. Traces of DNT are often present in land mines.

MACHINE Land mine.

ALAN ALDA Wow. It just tells you in plain words, land mine.

JOEL WHITE Yeah, it doesn't mince words at all does it?

ALAN ALDA Here we go to the next one.

ALAN ALDA (NARRATION) The last of the test jars contains methanol, or wood alcohol.

ALAN ALDA And this will say double malt scotch.

JOHN KAUER It could. We've tested it on beers…

MACHINE Methanol.

ALAN ALDA Wow. Pretty smart.

JOHN KAUER At least it can discriminate between Sam Adams and Corona. We've done that experiment.

ALAN ALDA (NARRATION) Here's what's been happening each time the machine took a sniff. A valve at the business end of the tube opens, drawing air into a detection chamber lined on one side with tiny light emitting diodes, and on the other side with sensors made of different chemicals. The molecules in the odor react with these sensors, slightly changing the color or brightness of some, leaving others unaffected. The computer looks at the total pattern of response to each odor, creating a characteristic signature for each. The device is based on how the Tufts researchers think real dog noses work -- and, like a real dog's

nose, the machine can be trained. This is essential if you are looking for different mines buried in different places for different lengths of time.

ALAN ALDA This mine buried in Bosnia would smell different from the same mine buried in Vietnam.

JOHN KAUER One might imagine that to be true. There are no data that I know of that have shown that explicitly, but the experience from using animals like dogs is that you have to train them at the local environment.

ALAN ALDA Is the idea of training the dog or the device on the site so that any chemical changes that have taken place since the mine was placed there that are peculiar to that site would be recognizable?

JOHN KAUER Exactly right.

MACHINE Blank.

ALAN ALDA (NARRATION) With the machine trained to recognize DNT as a land mine, it's time to put it through its paces.

ALAN ALDA This thing is a lot smarter than I am…

MACHINE Blank.

ALAN ALDA Except that so far it seems to think that everything is a blank.

JOEL WHITE It thinks everything is a blank.

ALAN ALDA (NARRATION) And this jar, I happen to know, contains DNT.

MACHINE Blank.

ALAN ALDA It's getting adamant about it too. Have you noticed the tone changing?

ALAN ALDA (NARRATION) Sadie the black Labrador performed this test flawlessly and in a few seconds at Auburn. But just as John and Joel are starting to sweat a little…

MACHINE Land mine.

ALAN ALDA Land mine here! Now, I don't care whether it's right or wrong, I would definitely take it seriously if it said land mine. Especially the way it screams it out like that.

ALAN ALDA (NARRATION) John has kept notes on our performance as we went around the ring.

JOHN KAUER So it's doing pretty well.

ALAN ALDA So out of six that we did so far, it's missed one.

JOHN KAUER It's missed one.

ALAN ALDA And it said it was blank and it was really a land mine.

JOHN KAUER That's the kind of error we don't want to make.

ALAN ALDA That's the kind of error you don't want. But five out of six isn't bad. You can get a new machine and probably another actor in here pretty quickly.

ALAN ALDA (NARRATION) Or another dog. Trained animals like Odo, a Belgian Malinois, continue to be the unsurpassed experts at the task John White has set himself -- which is why he's come to Auburn's Canine Olfactory Detection Laboratory to see Odo in action in a test chamber.

BARBARA Odo stays in the chamber, the session length is about an hour every day and gets approximately 45 to 50 trials per session. He starts out by hearing a beeping tone and that tells him to stick his nose in the nose cone and the odor is dispensed.

ALAN ALDA (NARRATION) Odo responds by pushing a lever, and is rewarded with some kibble if his response is correct. If he sniffs only clean air, he pushes the left lever. If he smells an odor, he presses the lever on the right. The strength of the odor can be reduced until Odo can no longer tell the difference between smell and no smell. This gives his threshold for detecting that odor -- which can be one or two parts per billion. Odo always seems shocked when he's wrong.

JOHN KAUER We think we're about ten times worse than a dog's sensitivity right now, and part of the reason that we're visiting is that we've made some improvements in the device that we hope will get us closer to what this animal is doing. But as I watch this, in fact I hadn't seen this as carefully as we're looking at it now before, it's clear that there are a whole bunch of other things that the dog is doing that our device is not doing. You can watch the dog anticipate and get ready for the next trial. Well, our thing just sits there, and although that sounds

trivial, I'm sure this is part of the process that allows the dog to do it so well, because he's focusing his attention at a particular period of time. Now, part of the issue of course in designing a better device is determining which of these things you'd like to replicate, and I think the lying down and stopping work is one of the things we don't want to replicate.

ALAN ALDA (NARRATION) Joel and John have brought their artificial nose to Auburn to run it head to head with dogs like Odo in a similar testing chamber. The machine sniffs in precisely measured doses of its test chemicals -- which include the landmine component dinitrotoluene, DNT.

JOHN KAUER So this DNT concentration is somewhere between 10 and 20 parts per billion. We would like to be down at about one part per billion.

ALAN ALDA (NARRATION) Today, the artificial nose again gets off to a rocky start…

MACHINE Blank.

JOHN KAUER Missed that one.

MACHINE Blank.

JOHN KAUER Missed that one too. It's missing DNT.

ALAN ALDA (NARRATION) But after Joel does some tweaking, the nose settles in for a run almost as impressive as Odo's.

MACHINE Dinitrotoluene.

JOHN KAUER This is what keeps you going in science, right? This is what keeps the juices flowing. It's great fun. What's the next one?

ALAN ALDA (NARRATION) John and Joel's enthusiasm may yet produce an artificial nose to rival -- or even better -- a dog's, and help save hundreds of lives from the millions of land mines still out there waiting to explode. Dog's meanwhile remain the unexcelled sniffing champions -- and not just because of their noses. According to John Kauer, they live in a smellier world.

JOHN KAUER There's a good reason why the animal's noses are down on the ground. Odors tend to be heavy. They're heavier than air. And so they don't rise, they sink, and there's a very rich odor environment down near the ground.

ALAN ALDA I'm going to check out what you said. First I'm going to do a little sniffing up here at around six feet…

JOHN KAUER This is the control.

ALAN ALDA OK. Now I'm going to check it out a little lower… Oh my god, yeah.

ALAN ALDA (NARRATION) It's true -- down here the world is a far smellier place.

ALAN ALDA And every few inches you get a different aroma, you know?

VIRTUAL DOG TRAINING

ALAN ALDA (NARRATION) Once upon a time, there was a dog named Silas.

ALAN ALDA Hello Silas.

ALAN ALDA (NARRATION) Silas lived in a so-called magic room at MIT's famous Media Lab.

ALAN ALDA Where are you going? Hey, come here.

ALAN ALDA (NARRATION) Although only a virtual dog, he'd been trained to respond to the gestures of the people who entered his life.

ALAN ALDA Sit, sit. Oh wow, look at that.

BRUCE BLUMBERG He's like a real dog, that sometimes he'll respond to your gestures and sometimes he won't.

ALAN ALDA Does he beg?

BRUCE BLUMBERG Yeah. Put both your hands over your head.

ALAN ALDA Wow.

BRUCE BLUMBERG Now sometimes Silas will do what he wants. So right now I think he's heading off to get a ball, because he figures…

ALAN ALDA Here he is, here he is. Give me the ball, give me the ball. OK, now I'll throw the ball for him.

ALAN ALDA (NARRATION) Several years -- and several thousands of lines of computer code -- later, Silas left his magic room and grew up to become Duncan, a sheepdog with an entire Scottish estate to roam around and a flock of virtual and rather flighty sheep to look after.

BRUCE BLUMBERG Away, away.

ALAN ALDA (NARRATION) Like Silas, Duncan is the creation of a Media Lab team headed by Bruce Blumberg.

ALAN ALDA So away tells the dog what?

BRUCE BLUMBERG Away tells him to circle around the sheep, keeping the sheep in his left eye.

ALAN ALDA In his left eye.

BRUCE BLUMBERG So he's going to be circling around the sheep, which is an instinctive behavior for herding animals, for herding dogs. "Bye" tells him to circle keeping them in his right eye, so that would be clockwise around.

ALAN ALDA Bye. Bye?

BRUCE BLUMBERG Bye. These are all Scottish terms.

ALAN ALDA Oh I see.

BRUCE BLUMBERG I don't know why the Scots came up with them but we thought we'd have a little tradition here. Down.

ALAN ALDA (NARRATION) And just like their traditional counterparts, all the creatures on the screen have minds of their own -- with Duncan's being a good deal smarter than the sheep's.

BRUCE BLUMBERG When I tell him "away" for example, he understands that command, but then it's up to his own intelligence in order to figure out how far away from the sheep to go, how to avoid the obstacles that he sees. Very much as if you had a puppy and the puppy comes with some basic abilities and then you're training it to use this action to get particular…

ALAN ALDA Now he's got them in kind of a lump over there.

BRUCE BLUMBERG Yeah, that's good. Maybe I shouldn't do anything. He's doing a great job of herding if I don't do anything. Would you like to try it?

ALAN ALDA Yeah, sure.

BRUCE BLUMBERG Alright. What you need to do is say one of those words and then we'll click on it.

ALAN ALDA Away. Bye.

ALAN ALDA (NARRATION) This is the easy part -- getting virtual Duncan to recognize my voice. Now things get trickier.

ALAN ALDA Can I just decide where I want to herd them to, it doesn't matter?

BRUCE BLUMBERG You're the shepherd. There's no sort of winning and losing in this.

ALAN ALDA Away.

ALAN ALDA (NARRATION) Things start off promisingly…

ALAN ALDA Steady. I've lost a sheep here.

ALAN ALDA (NARRATION) But then Duncan and I seem to go our different ways.

ALAN ALDA Bye. Pay attention. Bye. No… He's just separated the whole herd of sheep here.

BRUCE BLUMBERG Someone's separated the whole herd of sheep.

ALAN ALDA Well, if you don't mind I'll blame him. Now this really calls to mind an interesting question. Let's say I got really good at this…

BRUCE BLUMBERG Why.

ALAN ALDA Yeah, why? Why have you gone to all this trouble?

BRUCE BLUMBERG Well, the fundamental thing I'm interested in is sort of the nature of intelligence. What is it that sort of is going on in our brains that allows us to have the every day kind of intelligence that gets us through our day? And for me, dogs are a perfect model of that. Because dogs really have dinky little brains -- their brains are the size of lemons if they're a big dog -- and yet they have the kind of common sense that underlies 90% of our behavior.

ALAN ALDA (NARRATION) Duncan's common sense -- along with this ball on a stick called an Ally-Oop -- has allowed Bruce to train him. To find out how we took a break from virtual dogs -- Duncan politely waving goodbye -- to visit a real one.

GARY WILKES See what he's doing?

ALAN ALDA Yeah.

ALAN ALDA (NARRATION) This is Tug, who lives in Phoenix with his owner, Gary Wilkes. Gary uses a clicker to tell Tug when he's done something good -- in this case touch the Ally-Oop with his nose -- then gives him a treat.

GARY WILKES What he was doing was paying attention to the click. The things which draw the clicks he will repeat. In the meantime, if he's not sure what caused the click, he's free to try other things. The same way that if a door doesn't open when you try the doorknob, you might do something else like pull out a key.

ALAN ALDA He's sure it's got something to do with paws…

ALAN ALDA (NARRATION) By not clicking for a while, Gary can get Tug to experiment even more.

GARY WILKES He knows it has something to do with the target and he knows it has something to do with touching it, but he's not sure what. And you're hearing the vocalizations coming through.

ALAN ALDA (NARRATION) But from Tug's apparent frustration comes inspiration.

GARY WILKES Now he just came back and touched it with his nose and paw. He's trying to cover all the bases to make sure that…

ALAN ALDA Now he's touching the ball with his paw.

GARY WILKES And barking, and sitting. He's throwing all kinds of stuff in there.

ALAN ALDA He's giving us more than our money's worth.

GARY WILKES Exactly.

ALAN ALDA Well, come over here Tug. Do something with this thing.

ALAN ALDA (NARRATION) I've come to Phoenix because Bruce Blumberg has modeled how he trains Duncan on how Gary trains Tug. The Ally-Oop provides Tug with a target. The idea here is to see if I can get Tug to go back and forth between me and the target even as I move further and further away. Tug does just fine…

ALAN ALDA Ow!

ALAN ALDA (NARRATION) … apart from including my fingers with the treat.

GARY WILKES There we go. See how the click stops the behavior? It lets him know exactly what he's supposed to do. Now twice you've clicked with him coming toward me rather than actually touching the ball. And so what you're teaching him to do is come to me but to return back to you. And now let me remove the target and you'll see that the behavior still exists.

ALAN ALDA (NARRATION) Tug takes his usual finger or two, then dutifully trots off. So far I've used no words to get Tug to perform -- just the click and the treat.

GARY WILKES Slowing down.

ALAN ALDA He looks like he's thirsty.

ALAN ALDA (NARRATION) But now it's time for some commands.

GARY WILKES So I'm going to say right and then point, click, treat. If I do that about 20 to 50 times, he will automatically start to integrate that into it.

ALAN ALDA Right.

GARY WILKES Click.

ALAN ALDA OK. Now, watch this. Left. Pretty quick. OK, left. Left. Right.

ALAN ALDA (NARRATION) After associating word and action, Tug now can recognize the words as commands.

GARY WILKES … make him go to the right once. Give him the click, then on the way back just ask him to do another one.

ALAN ALDA Left

GARY WILKES Now this time don't even click. Just ask him to go right.

ALAN ALDA Right.

GARY WILKES See what's happening? We're dropping out the tools. You don't need to click and treat every time. After a while you'll have the dog who just does the behavior and a sporadic occasional pat on the head is all you need.

ALAN ALDA (NARRATION) Now the question is, can I use what I learned from Tug to train Duncan. Of course, Duncan doesn't eat kibble…

ALAN ALDA Now when I do the click, that means he automatically gets a treat. And it's a virtual thing…

BRUCE BLUMBERG That's right.

ALAN ALDA So I don't have to wait for him to come back to me to give him a treat.

BRUCE BLUMBERG No.

ALAN ALDA I want to see if I can get him to do what I got Tug to do, to go back and forth between two. Now that's cute, but forget it.

BRUCE BLUMBERG OK, you can click.

ALAN ALDA (NARRATION) At first I use the clicker simply to reward Duncan for going to an Ally-Oop. Then, just as I did with Tug, I add a command.

ALAN ALDA Left.

BRUCE BLUMBERG Click now.

ALAN ALDA (NARRATION) To begin with I give the command when he's already doing what I want.

ALAN ALDA Right. Left.

ALAN ALDA (NARRATION) Now it's time to see if he'll obey the command.

ALAN ALDA Right. So it looks like he's got that, huh?

BRUCE BLUMBERG Well, you never can be too sure.

ALAN ALDA Shall I try the same one again?

BRUCE BLUMBERG Try left actually.

ALAN ALDA Left.

ALAN ALDA (NARRATION) But now Duncan, borrowing a page from Tug's book, tries running through his repertoire instead.

ALAN ALDA Now I understand why dogs do this. He's just trying out, seeing what I like. Trying out a lot of different things.

BRUCE BLUMBERG Say left again.

ALAN ALDA Left.

BRUCE BLUMBERG He thinks the blue one's left.

ALAN ALDA Oh, he does?

BRUCE BLUMBERG Say left again, he'll go over…

ALAN ALDA Left. He does.

BRUCE BLUMBERG You've actually trained him to go to the blue Ally-Oop.

ALAN ALDA Right. Oh, he goes there no matter what I say.

ALAN ALDA (NARRATION) So far, Duncan is reminding me only too vividly of dogs I have owned. But now I'm going to see if I can teach him something new.

ALAN ALDA Jump.

ALAN ALDA (NARRATION) Again, I first wait till he jumps then say the word.

ALAN ALDA Jump.

ALAN ALDA (NARRATION) But now comes the moment of truth…

ALAN ALDA Jump.

ALAN ALDA (NARRATION) Will Duncan treat the word as a command?

BRUCE BLUMBERG Cool. Cool. Do it again. Do it again.

ALAN ALDA Jump.

BRUCE BLUMBERG Awesome. Awesome. You know you are the… this is a pretty fresh demo, meaning you are the first person outside of the group that's actually trained this dog.

ALAN ALDA Oh that must make you feel great that an amateur can do it, that's great. Well, look, I was getting ready to tell you that Tug learns faster…

BRUCE BLUMBERG No, he learns much faster that a real dog at the moment. But it's basically the same mechanism that's going on in Tug's brain, at least that's what we are trying to model.

ALAN ALDA Look, he won't stop jumping now, look. Jump.

GARY WILKES Hey bub, let's see what you're going to come up with now.

ALAN ALDA (NARRATION) Back in Phoenix, Tug neither knows nor cares that Bruce Blumberg is modeling his brain. But his owner is impressed.

GARY WILKES The perspective they have there at the Media Lab is one of gradually increasing complexity. And what they have accomplished so far is pretty remarkable. And as he continues to push in that direction of sort of adding extra bells and whistles to their dogs, I find that they come closer and closer to what I know real dogs to be like.

ALAN ALDA (NARRATION) Bruce Blumberg hasn't relied solely on Tug for his insights into what real dogs are like. He also has own Silky Terrier Sydney for inspiration. But while Sydney gets plenty of attention before Bruce leaves for the office, like a lot of dogs he then spend much of the day waiting for him to return. So Bruce has a plan…

BRUCE BLUMBERG Touch Sydney.

ALAN ALDA (NARRATION) And this being Bruce, it inevitably involves an Ally-Oop, a clicker -- and a computer. Yes, both Bruce and Sydney are on the 'Net.

ALAN ALDA He just hears your voice.

BRUCE BLUMBERG Over the microphone, this is going over the Internet. Sydney, touch. Good boy. Right there I clicked, and now I can give him food.

ALAN ALDA (NARRATION) The food dispenser too is controlled over the Internet. Sydney may be enjoying the game, but he still has a mind of his own.

BRUCE BLUMBERG Sydney, down. Down. Down… All right, Sydney, sit.

ALAN ALDA There used to be a vaudeville act like that. Well, now he's down.

BRUCE BLUMBERG Now he's down. Sydney touch. Good boy. What I'm really interested in is trying to see if we can use technology to enhance the lives of these animals and enhance our relationship with these animals. So Sydney spends most of the day alone with Katey our collie. And he's sleeping, he's bored, chewing on stuff. And I'm at my office and I'd love to be able to see him…

ALAN ALDA Bored, chewing on stuff…

BRUCE BLUMBERG Yeah, bored, chewing on stuff. And it's a problem, you know? The office furniture…

ALAN ALDA You miss Sydney.

BRUCE BLUMBERG Right. So I was thinking, could we come up with an interface that would be fun for me and fun for him. And also maybe that we could help doing some training over the Internet when I wasn't there.

ALAN ALDA How many sessions have you had with Sydney now?

BRUCE BLUMBERG Three.

ALAN ALDA Three. That's all?

BRUCE BLUMBERG Yeah. This is literally the third time that we…

ALAN ALDA Well why don't we try to get him to do something he's never done before?

BRUCE BLUMBERG Boy, are you brave.

ALAN ALDA No, let's see, let's see what you can do.

ALAN ALDA (NARRATION) Rising to the challenge, Bruce has his graduate student, Ben Resner -- who's at Sydney's end of the Internet link -- put a toy panda in his room. When Bruce squeezes a twin of the panda at his computer, Sydney's panda also cries.

ALAN ALDA (NARRATION) When Sydney noses the panda in curiosity…

ALAN ALDA There he goes.

ALAN ALDA (NARRATION) … he gets a click and a treat.

ALAN ALDA It seems to me, if you can get him to consistently touch that, eventually he'll take a bite or move it and then you can start to reward that and you can get him to move it across the room.

BRUCE BLUMBERG That's right, that's right.

ALAN ALDA (NARRATION) So, let's see…

ALAN ALDA There we go, he gave it a real shove. He's really moving it now, he's getting very aggressive.

ALAN ALDA (NARRATION) So there we are, a world's first -- a terrier trained over the Internet to harass an annoying toy panda. We could have been half a world away -- or, as Sydney decides it's time to reveal, just next door.

BRUCE BLUMBERG Hi Sydney.

ALAN ALDA Sydney, very good job.

ENTERTAINING PARROTS

MAN'S VOICE What is it?

ALEX Key chain.

MAN'S VOICE Good boy.

WOMAN'S VOICE Good birdie.

MAN'S VOICE What a smart birdie.

ALAN ALDA (NARRATION) We first met Alex ten years ago. He astonished us then.

MAN'S VOICE What is it?

ALEX Rock.

MAN'S VOICE Good boy.

WOMAN'S VOICE Yeah, good birdie. Alex, what toy?

ALEX Nail.

WOMAN'S VOICE Nail, that's right, you're a good birdie. Tell me, what color. What color?

ALEX Yellow.

WOMAN'S VOICE Yellow, that's right.

ALAN ALDA (NARRATION) He even knew what things are made of.

MAN'S VOICE What matter?

ALEX Wood.

WOMAN'S VOICE Good boy.

MAN'S VOICE Yeah, that's right. Very good.

IRENE PEPPERBERG How many? Good boy, how many?

ALAN ALDA (NARRATION) Irene Pepperberg was Alex's chief mentor.

ALEX Two.

IRENE PEPPERBERG Good parrot, good boy.

ALAN ALDA (NARRATION) Back then, Irene and Alex worked at the University of Arizona.

IRENE PEPPERBERG What color bigger? You know, what color bigger?

ALEX Yellow.

IRENE PEPPERBERG Good boy, good birdie.

ALAN ALDA Hello Alex.

ALAN ALDA (NARRATION) But when we caught up with them recently, Irene was a visiting professor at MIT's Media Lab.

ALAN ALDA Can Alex do any new things since we saw him last?

IRENE PEPPERBERG Yeah, we're going to do a couple of new things. I'm going to start him with some old things just to warm him up a little bit.

ALAN ALDA OK.

IRENE PEPPERBERG So these are two objects, and we pulled them out of the tray. And the neat thing about this is that if he didn't really understand what we were all talking about he wouldn't be able to answer the several series of questions that I'm going to ask him. He'd just have a single response to these things. Can you tell me what's here? What toy?

ALEX (Very softly) Key.

IRENE PEPPERBERG Can you say it better? Say it better.

ALEX Key.

IRENE PEPPERBERG That's right. Can you tell me how many? Come on, can you tell me how many?

ALEX Two.

IRENE PEPPERBERG Very good. We keep going. Can you tell me what's different? What's different?

ALEX Color.

IRENE PEPPERBERG Very good. Different color. And can you tell me what color's smaller? What color's smaller? What color's smaller?

ALEX Green.

IRENE PEPPERBERG Green. You could have said that a little better. But that's a good boy.

ALAN ALDA (NARRATION) Alex is now learning to recognize numbers up to six -- which is about as high as he can count.

IRENE PEPPERBERG Come on, what number is grey?

ALEX Want nut.

IRENE PEPPERBERG Well tell me. What number is grey, and you'll get a nut. What number is grey?

ALEX Four.

IRENE PEPPERBERG Very good. Good boy.

ALAN ALDA Want nut. You get a big nut.

IRENE PEPPERBERG You get a big nut.

ALAN ALDA How did you get to this point?

IRENE PEPPERBERG Do a modeling. We do a modeling training system, which is really fun, which I just so happen to have something we're working on here.

ALAN ALDA OK.

IRENE PEPPERBERG And we can demonstrate to him.

ALAN ALDA Good, yeah.

IRENE PEPPERBERG So what we do is, I act initially as the trainer. And you act as the model for the behavior, and his rival for my attention.

ALAN ALDA Oh, OK.

IRENE PEPPERBERG So I ask you about this, and if you get it right, you get to play with it.

ALAN ALDA Oh, OK.

IRENE PEPPERBERG So you tell me, what's here?

ALAN ALDA Spoon!

IRENE PEPPERBERG Spoon, there you go. You got the spoon. That's what he does with it, yeah. OK, then we exchange roles, so he sees that you're not always… I'm not always the questioner and you're not always the responder but it's a… thing. And if I make a mistake, you can take the spoon away and scold me.

ALAN ALDA What is this?

IRENE PEPPERBERG Squawk.

ALAN ALDA No, wrong, wrong. Try again now, try again.

IRENE PEPPERBERG Spoon.

ALAN ALDA Very good.

IRENE PEPPERBERG OK, so he sees that not only any sound causes a transfer of the object, but a specific sound.

ALAN ALDA I find this very hard to believe that he's seeing all this and drawing these conclusions.

IRENE PEPPERBERG And he does. Can you tell me, what toy? What toy? What toy?

ALEX Key.

IRENE PEPPERBERG No you're wrong. What toy?

ALAN ALDA Spoon.

IRENE PEPPERBERG Spoon, you're right, spoon.

ALAN ALDA Oh I love this spoon. You're really missing out on a great spoon here.

IRENE PEPPERBERG See look at that. Oh he's a great trainer, we should hire him.

ALAN ALDA What toy? I'm serious about this. What?

IRENE PEPPERBERG Want a nut.

ALAN ALDA Want a nut. Sure you want a nut. Just tell us what the spoon is, you'll get it.

ALEX Sss…

ALAN ALDA Very good, here take it.

IRENE PEPPERBERG Spoon.

ALAN ALDA So that's the beginning of spoon. Now if you do it a few more times can you get him to get that N sound in there?

ALEX Sss…

IRENE PEPPERBERG Say the whole thing.

ALAN ALDA Say the whole thing. What toy?

ALEX Sss… sss… poon.

IRENE PEPPERBERG Spoon, alright. He's beginning to get it.

ALAN ALDA OK. Slow speech.

ALAN ALDA (NARRATION) Alex has been working with Irene for some 23 years now, and has recently been joined by two fellow African Greys, Griffin and Wart. Despite the birds' striking abilities, they look oddly out of place in a lab famous for being on the cutting edge of high tech.

ALAN ALDA We're surrounded by computers here, in this lab. And all of a sudden you walk in this room and there are all these birds, very low tech it seems…

IRENE PEPPERBERG Except they're really animated…

ALAN ALDA What's the connection here?

IRENE PEPPERBERG Well, they first asked me to come here because they were interested in intelligent learning systems, and the idea of using these birds as a model system, seeing if they could adopt the way we train these birds to train their computers. But once I got here and saw the wonderful things they could build and do, I started getting in to what we call our pet projects, which is using technological information and know-how to build different games, different toys, different things to keep these birds with their brilliance, entertained throughout the day.

IRENE PEPPERBERG Hello.

ALAN ALDA Hello.

ALAN ALDA (NARRATION) To find out just why parrots need entertaining, Irene and I took a trip to an extraordinary parrot sanctuary about an hour south of Boston. Here nearly 200 birds of all shapes, sizes and colors inhabit a large barn and most of the house of Foster Parrots' founder Marc Johnson.

MARC JOHNSON Welcome. Welcome to my madness.

ALAN ALDA Where do all these birds come from?

MARC JOHNSON These are all, well, these are all from the rejects of the pet trade I guess, that's the simplest way to say it. In the sense that people that bought a bird on impulse and found out for one reason or another it was just too much for them to care for, a little too dangerous, a little too noisy, and in fact they're just showing their natural behavior and it's difficult.

ALAN ALDA Do you get bitten much?

MARC JOHNSON All the time. I bleed on a daily basis.

ALAN ALDA Really, how close should I get to these birds?

MARC JOHNSON Well, actually, all the dangerous ones are probably put away. There's one that you want to be careful of and that's Nate over there in the cage in the corner. He's an interesting case in that he was someone's best friend for six years and suddenly became very aggressive and bit her ruthlessly. I mean mouth, face, and she just lost her confidence. And that's another reason that people give up their birds, is once you no longer feel safe to hold your bird, then it tends to stay in its cage a lot. And then the guilt sets in, and then they come here.

ALAN ALDA (NARRATION) When at Foster Parrots, many of less dangerous birds roam around freely. Most quickly form attachments with the human volunteers who help look after them.

VOLUNTEER I love you too.

ALAN ALDA (NARRATION) Marc's goal is to place as many of the birds as he can with new owners. But before you can adopt a bird, you have to convince Marc that you know what you're in for.

ALAN ALDA Who is this guy?

MARC JOHNSON This is Psycho.

ALAN ALDA Wait a minute, how close should we get?

MARC JOHNSON Well actually his name is more about his playfulness as oppose to his nuttiness. He is very playful. And he seems to have really bonded with me, very strongly. He came from a guy who basically felt guilty about not giving him enough attention. And he's a perfectly wonderful bird, and…

IRENE PEPPERBERG Other than eating your clothing.

MARC JOHNSON And he paid maybe $2500 for the bird.

ALAN ALDA Tell me how hard it is on the parrot to be kept in somebody's home. What are the problems that the parrot has?

IRENE PEPPERBERG You can start by thinking about taking a four-year old child and putting it in a playpen, a four-year old, and putting it in a playpen with maybe one or two toys and leaving it eight hours a day. And you can imagine the anger and frustration that will accumulate over the whole day. So when you come home, this kid is not going to be, oh I love you I love you. It's going to be screaming, yelling, getting out its frustration, and your response is often, I don't want to be near this maniacal creature screaming at me.

ALAN ALDA Unlike dogs… oh, I'm sorry. You know I've had many directors try to keep me from gesturing so much. I think this is the Spielberg of parrots here I think. I'm sorry, I'll try, you know…

IRENE PEPPERBERG You just want attention.

ALAN ALDA What a look I'm getting. Drove it out of my head completely. Unlike dogs who've had thousands of years co-evolving with us, these animals are totally wild and we expect to be able to just cut them off from their instinctive behaviors without paying a penalty.

MARC JOHNSON And deny them of all the rich life that they had. I mean, they were designed to fly and now we're confining them to a two dimensional world and in lots of cases even shrinking that down to the size of a small cage. It's got to be devastating on their psychological make-up. I don't understand actually how some birds seem to manage it.

ALAN ALDA (NARRATION) Helping fellow parrots manage it in the human world is now one of the tasks facing Alex and his colleagues.

IRENE PEPPERBERG Come here Wart.

ALAN ALDA (NARRATION) Irene Pepperberg's idea is to use technology to give their smart little brains something to chew on.

IRENE PEPPERBERG We'll let Grifs do it.

ALAN ALDA (NARRATION) Back at the Media Lab, Irene's hooked up a controller to one of three nut dispensers. The parrot has to read the arrow and do what it says -- in this case, lift the lever up.

IRENE PEPPERBERG Good boy.

ALAN ALDA Wow. Doesn't think about it too long, does he?

IRENE PEPPERBERG Come on.

ALAN ALDA (NARRATION) Now the set-up's been changed so that the arrow says twist.

ALAN ALDA Wow.

IRENE PEPPERBERG Good boy.

ALAN ALDA (NARRATION) Grif will respond with the appropriate motion no matter where the instruction arrows are placed. Irene plans to see if her parrots can respond to a series of instructions -- twist, lift, pull -- pull, twist, lift -- to both study how they think and to be a prototype game console for smart parrots everywhere.

IRENE PEPPERBERG OK, good boy. This is what we call our Interpet Explorer.

ALAN ALDA And they like that?

ALAN ALDA (NARRATION) Another of her prototypes is based on a familiar web browser.

IRENE PEPPERBERG It's not really a web-based system, where they can get on to the 'Net. But what it is is a bunch of different sites that they can access through these little things.

ALAN ALDA The parrots access sites.

IRENE PEPPERBERG Yes, we're hoping they will. This is actually just got this up and running this week. Are you watching, Alex?

ALAN ALDA Look, I pushed and I got a parrot.

IRENE PEPPERBERG You see that?

ALAN ALDA Take a look back here. Look back here.

IRENE PEPPERBERG Alex, look, look there. I moved this one. OK. There's me.

ALAN ALDA Behind you.

ALAN ALDA (NARRATION) During our filming, Alex remained resolutely uninterested in the browser -- even when it was showing video of his wild cousins in Africa.

IRENE PEPPERBERG There's nothing we can put on here that will be as interesting as you and me sitting here talking. And the purpose of this is for something they can do when they're alone in their cage. And we'll be setting it up in the next couple of weeks and then videotaping what they do…

ALAN ALDA When they're alone.

IRENE PEPPERBERG When they're alone.

ALAN ALDA (NARRATION) Of course, that was something we couldn't resist eavesdopping on. So we too set up an unattended camera to see how Alex liked his browser when no one was around. He didn't seem to be much into pictures. But music -- well, just listen to this… And he loved the video of one of his human friends.

ALAN ALDA So then I guess eventually in a couple of months or so you'll be able to give him his own credit card and let him go to Amazon.com. You know, actually he can go to the PBS web site and he can get Scientific American Frontiers and he can see this episode right on his own computer, and he can watch it over and over again.

IRENE PEPPERBERG And see if he likes it.

ALAN ALDA Well, he's bound to like it. I mean, we give parrots what they want.

THE BITE STUFF

ALAN ALDA (NARRATION) America's pets eat 9 billion dollar's worth of commercial pet food a year. These dogs are members of a canine elite that decides what the rest of the nation's dogs -- or at least their owners -- will be buying next. They are taste testers at the Kansas research center of a leading pet food manufacturer.

MIKE HAND Hi Alan, this is Tango

ALAN ALDA Hi Tango...

ALAN ALDA (NARRATION) As I found out, the big trend for dogs -- as in humans -- is to healthier, less-fattening foods. Even the newest treats are nutritionally balanced.

MIKE HAND You can eat these if you want, they're just not that flavorful.

ALAN ALDA You know, this doesn't taste bad.

MIKE HAND If you would use these as hors d'oeuvres at your next party, they won't break you.

ALAN ALDA You could just pass one around.

ALAN ALDA (NARRATION) There's a back-to-nature trend, too.

ALAN ALDA Before people were responsible for feeding dogs, what did dogs eat on their own?

MIKE HAND Well dogs are omnivorous naturally. They eat plants and animal tissue. So in the wild they tend to eat things like small mammals, rabbits, mice, rats.

ALAN ALDA (NARRATION) The surprise on the list was plants.

MIKE HAND Coyotes will go in and devastate melon patches and plums and cherries, that sort of thing. If you look at his teeth these in the front are his canines. These were adapted for cutting and tearing. They're actually sharp on the backside. But the back teeth are a more table-like surface for grinding.

ALAN ALDA (NARRATION) In the wild, tearing and chewing all those plants and animals keep dogs' teeth in good shape. But supermarket diets don't give the teeth that good a work-out.

DAN RICHARDSON Let's pull up the canine tooth, the stained tooth

ALAN ALDA (NARRATION) The result has become a common sight to dog owners and veterinarians. The computer reveals that the only the tips of the teeth are clean. The plaque, stain and tartar cause gum disease. But there is a solution.

ALAN ALDA How often do you brush a dog's teeth?

DAN RICHARDSON It's highly recommended but it's not often done. Most veterinarians, if not all, will recommend that all dogs have their teeth brushed.

ALAN ALDA How often though?

DAN RICHARDSON Every day.

ALAN ALDA Every day?

DAN RICHARDSON Every day.

ALAN ALDA Because plaque builds up ...

DAN RICHARDSON Within minutes.

ALAN ALDA Within minutes?

DAN RICHARDSON Within minutes.

ALAN ALDA Now open your mouth Penny, I'm just going to brush your teeth a little bit okay? Just open, open up your mouth.

ALAN ALDA (NARRATION) It's no surprise only one in six owners brush their dog's teeth.

ALAN ALDA I think I need a little help with this. How would you do it? HANDLER First of all you want to settle her down and make sure she's not upset.

ALAN ALDA And you do like a circular motion?

HANDLER Yes. Even with positive reinforcement she's already developing a lot of anti-brushing behaviors.

ALAN ALDA This is really tough to believe that somebody's going to do this every day.

DAN RICHARDSON Well that drove us toward the one aspect of the concept of developing a diet that would be like having an edible toothbrush.

ALAN ALDA (NARRATION) This is conventional dried dog food -- kibble. It's bite-sized -- and that's its first problem.

LYN JENSON They're just inhaling this food, they're not even chewing it. And so to get an active effect in the mouth we're going to have to make the kibble size much larger.

ALAN ALDA (NARRATION) The research team swung into action. The first priority -- design a bigger, bolder kibble. But that was the easy part. As the first prototypes rolled off the production line, the bigger problem facing the development team was to make a kibble you can really sink you teeth into.

LARRY HAYWARD But I have the feeling from a texture standpoint the products that are out there today don't have the texture we're looking for cause if you break this stuff it just shatters. There's nothing left for the tooth to be cleaned with, to have that tooth brushing effect.

ALAN ALDA (NARRATION) To have a tooth-brushing effect, the kibble has to hold together while the tooth sinks in. Here's the artificial tooth -- complete with artificial plaque -- they use to test their prototypes. First, an old-style kibble. Only the very tip makes contact before the kibble breaks up. But with the eventual winning design... the tooth sinks in and is wiped clean. The secret is inside, where a scanning electron microscope reveals long vegetable fibers that bind the kibble together, as the tooth slides through it. A normal kibble, with no fiber fabric, simply crumbles. So the new kibble works in the lab. But what about where it counts? Wendy is having her teeth painted with the same discoloring stain dentists use to show up plaque on human teeth. After the staining, Wendy is let loose on a bowl of the new dental kibble. Two kibbles later -- and most of the stain has gone.

DAN RICHARDSON Clean right up to the gum line.

ALAN ALDA (NARRATION) Wendy settles in for four or five more pieces

ALAN ALDA Let's take one last look at Wendy's teeth. Open up, take a look at your teeth here. Wow, look at that, it's pretty clean.

ALAN ALDA (NARRATION) The edible toothbrush had certainly done a better job on Wendy's teeth than I had.

ALAN ALDA Good job.

ALAN ALDA (NARRATION) But edible toothbrushes won't work if they're not eaten. So after a flavor-boosting spray of fat and seasoning, the kibble is ready for the all-important taste-test. Tango was first up, and like a good company dog made the right choice. After that, though, on the day we came to film, things went

down hill. But of course there was an explanation. It turns out dogs don't choose by taste alone. Where the bowl is matters too.

KATHY GROSS Some dogs are either right handed or left handed just as some people might be. And in order to get around that bias we usually run a two day test. On the first day of the test pan A would be on the left side and then on the second day of the test pan A would be on the right side. So with the two days and switching the bowls from side to side on either day we avoid that "pawedness".

ALAN ALDA (NARRATION) According to the manufacturer, the verdict by the taste tasters was two to one in favor of the tooth-scrubbing kibble. Today it's available by prescription from your vet for any dog with a tooth or breath problem. Speaking of which: before I left, there was one more testing panel to visit. This time, the testers were human.

ALAN ALDA What do you do in this room?

LYN JENSEN We have developed a trained sensory panel of individuals who are able to detect odors in dogs' breath and to quantify them.

ALAN ALDA You have a trained panel of people who smell doggie breath for ... for their ... I mean that's what they do?

LYN JENSEN Absolutely. In addition to their regular jobs they volunteer for this.

ALAN ALDA Ahh, that's good. This is just a hobby.

LYN JENSEN Absolutely.

ALAN ALDA Do you grade it, like one to ten, this is really bad, or do you have names for how bad it is?

LYN JENSEN We have a scale of zero to nine. Zero is no noticeable bad breath. Nine is knock 'em dead.

ALAN ALDA (NARRATION) One of the beagles has been eating the new kibble, the other a regular diet. After the professionals make their choice...

ALAN ALDA Alright, put it right here Blackjack. Do I have to get down to the dog's level? Say ahhh. How do you get the dog to ...?

GRADER What we do, the procedure is, walk up, open up the dog's lips, get your nose right down there, and take three little bunny sniffs.

ALAN ALDA Let's see you do this.

GRADER Okay. Come here buddy. That's all there is to it. Think about it in your head, score it, rate it.

ALAN ALDA Come here. When you speak about this, and you will, be kind. I don't know what this dog has been eating but this is definitely a dog.

ALAN ALDA (NARRATION) I was hoping this one was on the new diet.

ALAN ALDA Hello. It's a better smell over here to my nose. How did you rate them?

GRADER I would've graded that dog probably a one and this dog probably a six.

ALAN ALDA Six out of nine. I never want to smell a number nine ever as long as I live.

LYN JENSEN So it sounds like you're about ready to sign up for the panel.

ALAN ALDA I think I could be a pro at this. It's been nice sniffing you. Goodbye.

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