HOW THE I.Q. ZOO ANIMALS ARE TRAINED

BY

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The IQ ZOO animals are trained using methods of modern psychology called OPERANT CONDITIONING. Operant conditioning, sometimes called BEHAVIOR MODIFICATION, was developed by B. F. Skinner, now at Harvard University. When we train with operant conditioning, we REWARD the good things an animal does and ignore those things the animal does that we don't want. After a while, the animal will only do those things that are rewarded and not do those things that are not rewarded. This is just how an animal (or a human, for that matter) learns how to do many things in its natural world.

Our training uses rewards (called positive REINFORCEMENT). No punishment is used with IQ ZOO animals. The rewards used are food rewards, and of course we use the food which is customary for each species. All of the IQ ZOO animals receive the amount of food needed to keep them in good health. They are neither underfed nor overfed. Overfed animals are overweight. There are few overweight animals in nature. A fat wild duck could not fly; a fat wild rabbit would be too slow to run away from a fox. Also, overweight animals, like overweight people, are prone to heart disease. In so many ways, IQ ZOO animals are lucky. They have a much greater chance to live to a ripe old age than have their wild cousins or those fated to be served on a plate. IQ ZOO animals are really the favored few.

Before we start to train a particular kind of animal, we find out what that animal does in its natural environment. Only natural activities are used for training. We do not actually teach the animal anything new; all we do is teach the animal when and where to make a natural response.

It is not possible to make an animal do something "unnatural." What appears to be unnatural in the behavior of the IQ ZOO animals is more in the eye of the beholder; for example, the duck "playing the piano" is really a duck dabbling for food in a pond, and the chicken "dancing" is really a chicken scratching for seeds and bugs in a barnyard. However, the results are the same -- the animal gets food, a little bit at a time. But here it is more reliable than in the wild. These chickens, rabbits, and ducks ALWAYS get fed if they do the right thing. In the barnyard and forest and pond, the animal is sometimes successful but often not.

While it may seem that every animal has many different kinds of behaviors, when we study carefully, we find there are really only a few that we can see and use. An animal moves from place to place by walking, running, climbing, swimming, flying, and so on. This is called PROGRESSION. Another form of movement is called MANIPULATION; a chicken may use its beak to pick up a seed pod and dash it against the ground until it breaks. The same movement can be used for many purposes; a rabbit may dig for food or dig a burrow. Each animal is limited in the number and kinds of movements it can make, and for most animals it is not hard to draw up a list of "what the animal can do."

How do the animals learn to perform for the IQ ZOO? Generally speaking, training is nothing more than a special kind of learning, or a program for learning. A school which teaches reading, writing, and arithmetic is training people in these skills. If you will recall your own schooling, the teacher taught from a lesson plan. You had to do some things time after time, sometimes repeating an assignment until you knew it by heart. The IQ ZOO school is much the same.

The teachers at the IQ ZOO are called trainers. Our trainers have been taught how to teach many different kinds of animals. IQ ZOO trainers have lesson plans, depending on the kind of animal, what the animal is learning to do, at what stage of training the animal is, and whether the particular animal in training is a slow, average, or fast

learner. Yes, there are individual differences in animals -- even in the lowly chicken!

So you can see, there are many similarities between our IQ ZOO school and human schools. Even the fact that learning takes place a little at a time we find applies to animals too. Our animals are taught to do difficult things by learning one small step at a time, just as you would teach a child.

There are some differences between the IQ ZOO school and the schools with which you may be familiar. First, we don't punish any of our pupils; if they fail to perform, as you might get a wrong answer, they are never punished. We just do it all over again. If the animal does right, it is rewarded; if the animal does wrong, this mistake is simply ignored and gradually drops out through a process the psychologist calls EXTINCTION. Extinction is very much like discouragement; if you don't get success when you keep trying and trying, you get discouraged, and quit. For example, if you try a key in a lock, and it doesn't work at first, you may try the key again, two or three times; but after a while, you get discouraged (or EXTINGUISHED) and stop...and probably try something else, like wiggling the key, trying a different key, lifting on the door, and so on. When an animal gets discouraged from lack of success or reward, it also often tries something else, maybe this time it will be right. And so, over a period of time, the animal tends to do more and more of the things we want it to do, and makes fewer and fewer mistakes. However, remember, there are no paddlings, or even scoldings at the IQ ZOO.

Another big difference between IQ ZOO training and teaching humans is that we can't talk to and be understood by our students; animals only have "conversations" in cartoons and our imaginations. We can't tell them what we want them to do and expect them to understand. Some animals, like dogs, monkeys, dolphins, and certain others can learn the meaning of a few words under special conditions, but as far as we know today, only humans have the gift of real language.

So, if we can't use words to tell the animal what we want it to do, how do we communicate with it? Since the animal can't understand us, and we don't understand the animal, we have created a language we both can understand; a language with only one word -- YES!

Our one word language tells the animal exactly when it has done what we want it to do. When the animal hears the "word" for YES, the animal knows it has done the right thing. The animal also knows that sooner or later, it will be fed some of its favorite food. By telling the animal YES at just the right time and ignoring the times the animal doesn't do the right thing, the trainer gradually teaches the animal to do only the right "lesson". The YES signal can be any signal the animal can see, hear, feel, or, in some other way, sense.

The teaching of the YES signal is the first step in the training of IQ ZOO animals. YES training begins by teaching the chicken, rabbit or duck to get its food from a special device called an electric feeder. The feeder is a small box filled with the right kind of food for the animal. An electrical mechanism dispenses a few pieces of animal food whenever the trainer pushes a button. The food falls down a chute into a small dish. The feeder makes a "clunking" sound every time the button is pressed and food is dispensed. The animal quickly learns that the sound of the feeder means that food is falling into its food dish; soon the clunk of the feeder operating becomes the all important YES word in our one word training language.

When the animal has learned to go to the feed dish every time it hears the feeder operate, we say the animal has been FEEDER CONDITIONED. This stage of training lasts from one to five days. A training session lasts about 30 minutes and there are from one to two sessions per day. We have learned that a few short sessions are much better than one long one. Also, more than two or three sessions per day may be difficult for some kinds of animals.

Each animal gets just the right amount of food each day to maintain proper health and appetite. It is not

difficult to feed animals properly. There are books and pamphlets printed by government agencies and private companies that give the approximate food requirements of almost any animal. We have found that animals are individuals, just as people are individuals, and that one animal may need more or less food than another animal of the same species. We may have to change the kind or the amount of feed, or both, if the animal is not maintaining the correct body weight.

It is easy to figure a proper diet for each animal. Each animal should receive a TOTAL DAILY RATION. The total daily ration is the total amount of feed that an animal needs each day to live in good health. Suppose, for example, we are training three large white Leghorn type chickens. Experience tells us that the total daily ration for this kind of chicken is about 3/4 of a cup of chicken feed each day. At the end of two weeks, one chicken is very thin, another one is too fat, while the third chicken appears to be lean and healthy. It is clear that the diet being fed these birds is not proper for each bird; the thin bird needs more food and the fat bird needs less. We adjust each bird's diet by trial and error until it is just right for that particular bird.

While an animal is in training, it gets much of its food from the electric feeder; we need to find out HOW much. The feeder is filled at the beginning, and end, of each training session. The amount of feed used to fill the feeder back up at the end of the session is the amount that animal received during the session. If we give more than one training session a day, the amount from each session is totaled. This total is then subtracted from that animal's total daily ration. At the end of the day, we then feed the remainder of the ration. Stated in a different way, the toal daily food ration of an animal in training equals TRAINING FEED (what the animal gets from the electric feeder) plus MAINTENANCE FEED (that fed to the animal at the end of the day or on days with no training sessions). Sometimes the feed that is used in the electric feeder may be the same as the maintenance feed, sometimes not. The

feeding formula is :

TRAINING FEED + MAINTENANCE FEED = TOTAL DAILY RATION.

We have found that an animal's total ration can change from month to month because of temperature, activity, the animal's age, etc. It is very important to keep an eye on the animal's weight. We sometimes use a small weighing scale to keep an accurate log of an animal's weight.

Once the animal has learned the meaning of the YES signal and the proper diet has been determined, we are ready to train the animal to perform in the IQ ZOO. First, we select some very simple behavior which we would like the animal to perform -- to peck at a spot, to pull at a plastic ring or loop, or to scratch on a board. Each time now that the animal performs this behavior, or something close to it, we push the button to sound the electric feeder. Soon the animal comes to know that this behavior is followed by the familiar "clunk" which means food is on the way. The animal is learning that we are saying YES to that behavior, and it tends more and more to repeat that behavior. A psychologist would say that this behavior is being CONDITIONED or strengthened.

What if the animal will not do what we want it to do? We have learned there are ways to help the animal perform the right behavior. For example, if we want a chicken to pull a loop, but the chicken simply looks at it, we may reward it for just looking. Next time the chicken will be more apt to touch the loop or pull it. We may even attach a piece of grain to the loop with plastic tape. This will really get the chicken's attention! Remember the Dancing Chicken? We have trained the chicken to scratch on a special smooth platform. Occasionally a chicken is slow to start to scratch on a smooth board. In such a case, we sometimes put some sand or a few pieces of straw on the board; this makes the board more like the natural surface of a barnyard. There are many such "tricks of the trade."

Once we have taught the animal the meaning of the YES signal, we can begin to teach it many new things. We can

take the simple behaviors we have begun to teach the animal and change and combine them in certain ways. For example, after we have trained the Fire Chief Rabbit to pull a lever just a little bit, we can say YES only when the rabbit pulls it harder and longer (what the psychologist calls DIFFERENTIATION). We can train the Piano Duck to pull the lamp cord only when the small signal light is shining (the psychologist calls this DISCRIMINATION). This light becomes a sign that tells the duck if it pulls the cord now, and then plays the piano, food will be the result. If the light is off, nothing works, and the duck will not be fed. We can combine several simple behaviors to form a series of behaviors; for example, the Piano Duck pulls the lamp cord and THEN dabbles on the piano keys. (This is known as CHAINING.) The Drumming Duck will play the drum not just once for one reward, but several times. (This is known as a response RATIO, or the number of responses needed to earn each reward.)

Usually, if the animal is to learn a series of responses, we start with the last step. Let's take the Piano Duck as an example. In the finished act, when a little light near the pull-cord on the lamp is lighted, the duck pulls the cord to turn on the lamplight, and then dabbles on the keys of a miniature piano, up and down the keyboard, until the feeder sounds. The duck then goes to eat. When we start to train, we first teach the duck to play on the keys. The lamplight is kept on all of the time. When the duck plays the piano properly, we teach it to turn on the lamp.

In another step of training we teach an animal it must perform a behavior more than once. We are teaching the animal a RATIO (remember?). There are different kinds of ratios. The ratio most commonly used by the IQ ZOO is the VARIABLE RATIO. Variable ratios are very common in a duck's life, and in your life, too. This is what happens to you when you go fishing. If you fish in a good lake, sometimes you cast out your bait and get a fish on the first cast. Then you cast again, and get nothing. Again you cast, and again, no results. Maybe on the third cast, you'll get a fish, and so on. If you go for many, many

casts without being rewarded, chances are you'll get discouraged (or EXTINGUISHED) and move on to another spot. In duck training, we gradually increase the number of times we ask the duck to dabble on the keys, and the duck never knows exactly when to expect a reward.

All the things we have talked about so far have described how we train some of the animals for the IQ ZOO. The other animals are trained in much the same way, except that we allow for differences between kinds of animals. Also there are different "tricks of the trade" for different species and different behaviors. In later sections we will go into detail about how some of the animals are trained in certain behaviors and some of the "tricks of the trade" we use.

TRAINING THE IQ ZOO CHICKEN

The common barnyard chicken is a small, usually timid bird related to a number of ground- and tree-living species found in many places in the world. Chickens are omnivores; that is, they eat both plants and other animals.

The IQ ZOO uses special breeds of chickens for training. Most barnyard fowl have been selected for fast growth, meat production, and egg laying. Long life and intelligence were of no concern to the farmer. We spent many years locating long-lived, easily tameable, and intelligent breeds of chickens. One type we use is the Southern "barnyard bantam," a hardy, miniature breed of mixed ancestry, commonly raised by Southern farmers. The other breed is a special mixture of strains, mostly white Leghorn.

We begin to train chickens when they are about six months old. The chickens are feeder conditioned and given an "aptitude test" at the same time in a special device designed and built by the IQ ZOO. The birds learn the YES signal while being studied by the IQ ZOO trainers. We try to find out which chickens will make the best dancers, which will be the best baseball players or basketball players, and so on. As an example, we put a chicken in this device, which contains a flat board floor, and teach

it the YES signal. Now we wait. If the chicken very quickly starts to scratch, we can bet that this chicken will be a good dancer. When the chicken starts to scratch on the board, we give the YES signal and the chicken eats. Again we wait. And again, when the chicken scratches, we give the YES signal. Soon the chicken learns that this is what we want it to do. As a rule, most of the bantam chickens that scratch during the first part of YES training are assigned to dance training.

Another natural response we use often in our training is pulling on something that resembles a worm -- usually a plastic ring or loop. At the front of the feeder conditioning device is a small box which has a loop mounted on top. Inside the box are relays and connections which make the electric feeder work automatically as soon as the chicken tugs lightly at the loop. Also it is possible to set the device so that the chicken must pull harder and harder in order to make the feeder work (remember DIFFERENTIATION?). Often, once the chicken has learned to eat from the feeder cup and has learned the meaning of the feeder sound, as it explores, the chicken will just naturally tug on the loop. If this happens, a very slight tug will automatically work the electric feeder, and the YES sound from the feeder tells the chicken it has done the right thing.

Sometimes the trainer is also standing by with a pushbutton to work the feeder. If the chicken doesn't quite pull the loop hard enough, but touches or even looks at the loop, the trainer may push the button to tell the chicken YES. To make things happen faster, the trainer may fasten a few grains of feed on the loop with a piece of plastic tape. This usually gets the chicken's attention and causes it to start pulling at first at the tape with the grain, and then at the loop itself. Now we ask the chicken to pull harder and harder. Birds who cannot pull hard enough get a FAIL on this lesson and go on to something else.

Another act we test for in this aptitude test device is the Basketball act, where the bird hits at a ping-pong

ball raised over a column of air and attempts to knock the ball into a basketball goal. To test for this behavior, we suspend a ping-pong ball over an opening in front of the testing chamber. If the bird strikes quickly at the ping-pong ball, the chances are high that this chicken will be a good basketball player. If the bird does not strike right away, we can tape a few grains of feed to that surface of the ball which faces the chicken. This is usually all that is necessary to get the chicken to start hitting, usually vigorously, at the ball. As soon as the bird strikes the ball with its beak, we say YES. Soon the bird is hitting the ball regularly, without our wiggling the ball or putting grain on it.

These are the main behaviors for which we give aptitude tests. Once the birds have passed their tests, we assign them to different "classes" to start learning their lessons.

The Dancing Bantam

In the finished form of this show, the chicken comes out of its "dressing room" at one side of the stage, walks across the stage, pulls a loop on a miniature juke box to start the music. The chicken then steps up onto a slightly raised circular platform and starts to "dance." The bird scratches around on the platform for several seconds until the feeder fires (back in the dressing room), and the chicken returns to its room.

As you can guess from the title of the act, we generally use barnyard bantams for this little show. Because they are rather small and active, the barnyard bantams furnish us with some of our best dancers. The larger breeds tend to be a bit more sluggish.

Once we have selected a candidate for the dance act, we first place the chicken very gently on a round, plastic platform, next to a miniature jukebox, and very near the feeder. We fire the feeder several times. Often the chicken will turn immediately and start to eat. If not, we repeat until the chicken starts to eat as soon as it hears

the "clunk" of the feeder.

After the chicken has become used to eating in this new situation, we wait for the bird's natural inclination to scratch. Often the chicken will very soon start to scratch. If it does, we say YES immediately with the feeder, at the first sign of a scratch pattern. If the bird is slow to start scratching in this new environment, we may put a few pieces of straw, even a few pieces of grain buried under straw, to encourage the bird. If the chicken now scratches with this "prompting," we gradually reduce the amount of straw until the bird is scratching on the bare platform.

Next we train the chicken to start the music for the dance. (Remember our reverse order of training -- last step first?) The miniature juke box close to the dance platform can be turned on if the chicken pulls a plastic loop mounted near the top of the box. During the basic dance or scratch training, this loop has been concealed. It is now made available to the chicken. In the feeder conditioning experience, the bird has learned to pull a plastic loop, and so, the chicken may quickly go to the now visible loop and pull on it. If not, we go back to the "teaser" steps described in training the loop pull, such as taping grain on the loop, using a pushbutton to operate the feeder, and so on. We reward any tug or even touching the loop. As the bird's pulls get stronger, we let the automatic system take over. When the chicken tugs hard enough to start the jukebox music, it automatically fires the feeder. When the loop-pulling response is strong, we drop out the food reward for this response and start putting the chain of behavior together. Now the bird must pull the loop to start the music, move to the dance platform, scratch on the platform, and eat from the electric feeder.

The next step is to start moving the electric feeder away from the platform toward the "dressing room" and finally into the dressing room. The feeder is moved a few inches at a time until after a few training sessions the bird has learned to walk from the platform, after the YES sig-

nal, into the dressing room and to the cup mounted there.

We now ask the chicken to dance for a longer and longer time on the platform. What we ask is for the chicken simply to stand close to a certain place on the platform for a certain number of seconds. The time the bird stands there and shades a photocell determines when the electric feeder will fire. But why does the chicken dance? Really it doesn't have to dance; all it has to do is break the photocell beam by standing in a certain area. The chicken's dancing has been rewarded, and soon the chicken believes it must scratch to be rewarded. The chicken has formed what is called a SUPERSTITION.

Many people have asked us about this dancing behavior and have wondered whether or not we shock the chicken to make it dance around like this. In the Middle Ages, dancing bears were trained in this way using a hot griddle, and of course they moved their feet around in a very fast shuffle to try to escape the painful situation. Now you know, the answer is plainly NO. We do not use ANY painful stimuli in training our animals.

The Basketball Chicken

The Basketball Chicken pecks at a ping-pong ball suspended in a column of air which comes out of a vertical tube. The ping-pong ball, propelled by the chicken, sometimes goes into a basket about 18 inches away from the tube. Points are scored for each basket. The chicken must make two baskets to finish the game. A grillwork keeps the bird from actually chasing down the ball. Scoring two baskets operates the electric feeder to give the chicken the YES signal and some food.

The initial training for this behavior is given in the testing device described on page 10. When the chicken starts the actual training in the basketball equipment, the ball is floating in the column of air at the top of the tube as in the final situation. However, the basketball goal is now in place very close to the bird -- only about six inches from the top of the tube. So the chicken needs

only to hit the ball hard enough at knock it into the basket at very close range, and at first only once for each reward, a FIXED RATIO of one, or what the psychologist would call CONTINUOUS REINFORCEMENT.

Now we start moving the goal farther away from the ball's starting position, about two inches at a time. The chicken gets enough sessions at each goal distance to make sure it has learned to knock the ball reliably into the goal at this distance. The bird is still being rewarded for each basket. Step by step the goal is moved farther away until it reaches the final distance.

When the chicken can readily knock the ball into the basket at this final distance, we now ask the bird to make two baskets in a row before the reward is given. This usually takes a number of training sessions before the bird has learned it must not stop after it makes the first basket, but keep trying for that second one. As a special YES signal, when the second basket is made, a bell rings, and then the feeder sound follows, giving the bird a double YES for its performance.

It takes about two months to teach a chicken to peck the ball into the basket well enough to be a graduate basketball chicken.

Bat Bird

Bat Bird is a chicken that plays a baseball game with a human. The game is played on a chicken-sized field. When it is the chicken's turn at bat, a signal light near the bat is turned on. The chicken pulls a rubber loop to knock the ball up the miniature field and into a score box. If the first stroke of the bat does not send the ball into a score box, the chicken keeps trying until it scores. Every other time the bird makes a score, the YES signal is sounded. A lighted scoreboard tells whether the bird has made a single, double, triple, or home run. Now it is the person's turn. The human plays by pushing a button to operate the bat and likewise plays until the ball lands in a score box. Each player takes a turn until the game is

completed when one player has received 6 points.

Chickens that do well on the loop-pulling part of the chicken "aptitude test" are candidates to be Bat Birds. Bat Bird trainees are placed into a standard Bat Bird unit -- standard except that the electrical feeder is operated by a pushbutton held by a trainer, rather than being fired by an automatic control device. Usually the chicken recognizes the loop right away and begins to pull at it. The trainer rewards the bird for pulling the loop. The pulls may be weak at first. Sometimes the trainer will reward the chicken even for touching or looking at the loop. After a few weak starts, the bird usually starts pulling at the loop vigorously enough to move the ball.

Now the trainer rewards only pulls on the loop that move the ball way up the field. When the bird is doing this regularly, the trainer now waits to reward the bird until the ball actually goes into one of the scoring slots. At this point, the bird is ready for its final training stage, and the trainer can disconnect the pushbutton and use the special electrical control device. The performance now runs automatically. When the bird sees the signal light come on next to the bat, it starts to pull the loop, batting at the ball until it makes a score -- the ball does not go into a scoring slot every time the bat strikes it. The number of times the bird needs to pull on the loop to activate the bat varies from trial to trial. So we say the bird is on a VARIABLE RATIO schedule of reinforcement. And this ratio is doubled later in training when the system is set so that only EVERY OTHER ball falling into a scoring slot feeds the chicken.

Bat Bird training is now complete. From one to two months are needed to train a Bat Bird chicken.

The Capsule Vending Chicken

The Capsule Vendor in its final form delivers a small plastic capsule which contains a toy or souvenir. When the chicken is given the signal (a light comes on near a plastic loop attached to the vending device), the bird pulls on

a loop which releases one of the plastic capsules. The capsule rolls down a metal ramp. The chicken pecks the capsule off the base of the ramp into a chute which delivers the capsule to the customer.

Birds are selected for small size and loop-pulling ability. Large birds are able to pick up the capsules rather than just pecking them into the chute. To the chicken, the capsule is something good to eat, such as a cricket or grasshopper, so the bird tries to catch it. Smaller birds are unable to grasp the capsules in their beaks. Strong loop-pulling ability is needed to release the capsules from the vending compartment.

After a suitable Capsule Vending Chicken has been selected, the first training step is to teach the bird to knock the capsule down the chute. The trainer places a capsule at the top of the chute; sometimes the chicken will peck at the capsule without any special prompting. If a chicken does not readily peck at the capsule, the trainer may place a grain of feed under the capsule. When the chicken knocks the capsule down the chute, the electric feeder says YES and rewards the bird. If a chicken does not readily peck at the capsule even with grain under it, the trainer may use a pushbutton to work the electric feeder and reward the chicken if it looks at or strikes ever so lightly at the capsule.

Once the chicken has learned to knock capsules down the chute quite regularly, the bird is taught to pull the loop to release the capsule from the vending bin. If the bird pulls hard enough, the capsule is released and rolls down the ramp to the top of the chute. Now the chicken can peck at the capsule, knock it down the chute, and be rewarded.

When the chicken has mastered loop-pulling and pecking at the capsule, the bird must now learn to pull the loop to start the sequence only when the signal light by the loop is turned on. In the early stages of training, the signal light has been on continuously. If the bird pulls at the loop when the light is off, nothing happens; no capsule

comes down the ramp, and the bird does not have the chance to be rewarded. And so the loop-pulling with the light off soon drops out (becomes EXTINGUISHED), and the bird learns to pull at the loop only when the light is on. It takes about one to two months to train a Capsule Vending Chicken.

The Postcard Vending Chicken

The Postcard Chicken begins by pulling a chain to light up a "Thank you" sign. Next the chicken pulls a loop to vend a card, after which the bird is rewarded.

This performance, like many of the other acts, involves a CHAIN of behavior: first, pulling a chain in response to a signal light, and then pulling a loop when another light turns on. Training begins by selecting strong loop-pulling chickens in the testing device. When we start training a chicken in the Postcard Vending equipment, we turn on the light by the loop. The chain is out of sight. Normally a good loop-pulling bird will go to the loop fairly quickly and tug at it. If not, some of the "tricks" are used, such as putting grain on the loop, wiggling it, and so on. At first the trainer is using a pushbutton and rewards the chicken even if the first pulls are not hard enough to work the vending device. The trainer then rewards stronger and stronger tugs until the bird is pulling at the needed strength (remember DIFFERENTIATION?).

Only one good tug is needed to work the vending device, so there is no need here to build up a ratio, but we do have another step in the series of responses, and two DISCRIMINATIONS to learn. The chicken must learn to pull the chain to turn on the signal light for the loop, to pull the loop only when that light is on, and also, to pull the chain only when the chain's signal light is on. So we now conceal the loop, but make the chain available. We turn on the signal light by the chain and encourage the bird to tug by wiggling the chain or "baiting" it with grain. The trainer may reward weak tugs at first, then harder ones, and drops out the extra cues such as grain. Soon the bird is pulling the chain hard enough to turn on the signal light by the loop.

Now we tie the two parts of the series together. With the light on by the chain, we ask the chicken to pull the chain, turn on the loop signal light, go to the loop and tug it hard enough to release a card. If the bird does not turn on the light, the loop will not work -- it will not release a card and it will not work the feeder, and so the loop-pulling without the signal light drops out (remember EXTINCTION?).

When the bird has learned these two parts of the response chain, we teach the final DISCRIMINATION: The bird must learn not to tug on the chain unless that signal light is on. The trainer now turns out that light, and the bird learns that tugging on the chain will not be rewarded by the loop light coming on and the feeder firing at the end.

Training is now complete. It usually takes about one to two months to train a Postcard Vending Chicken.

TRAINING THE IQ ZOO DUCK

The IQ ZOO duck is a rather special duck, not because of its breed -- usually the common white Pekin -- but because of the way it is raised. We have found that many animals do not become well adjusted to close contact with humans unless they are raised by people from a very early age and away from their own kind. The time period in the baby animal's life during which it must begin its life with the human, or with its own parent, is called by scientists the CRITICAL PERIOD; this period is different in various species of animals. In the Pekin duck, it takes place in the first week or ten days after hatching. In some other species, such as sea gulls and sheep, it may take place in the first day after hatching or birth. The process by which the infant becomes closely attached to a human, or its own parent, is called IMPRINTING.

Before we start to train an IQ ZOO duck, it must spend the first six to eight weeks of its life in close contact with a human. Usually we arrange this by asking school children to "adopt" the baby ducks for a few weeks. We give the children ducks just a few days old and ask the

children to play with the ducks, teach the ducks to follow them, just as the little duck would learn to follow the mother duck, and get the ducks used to seeing people and being handled by them.

After a few weeks of this type of human contact, the ducks begin their lessons at the IQ ZOO. The first step is to teach the young duck to eat from the electric feeder and to learn the meaning of the YES signal. An electric feeder is placed in a holding area; at regular intervals, the feeder makes the "clunking" sound which means that food is on the way. The duck soon learns that this CLUNK means food. And we go through the steps of teaching the duck that when that CLUNK sounds, it means YES to what the duck is doing at that time. Once the duck has learned what YES means, it is ready to begin one of its regular "classes."

The Drumming Duck

To beat the drum, the duck "dabbles" with its bill on a flat lever, or paddle, which operates the drumstick. Each time the duck depresses the paddle far enough, the drumstick strikes at the drum head and produces a resounding drum roll. The signal for the duck to start drumming is a small light which turns on near the paddle.

When the duck is first placed in the "classroom," it must learn the location of the electric feeder. If the duck is facing the drum, the feeder is directly behind the duck. It may take a few trials to teach the duck to turn completely around to get its food. Next, the trainer turns on the signal light and places a few bits of food on the paddle. Normally the duck will dabble at these, and usually in the process, will depress the paddle far enough to work the drum. The equipment is set so that the feeder will fire immediately if the duck depresses the paddle far enough just once. Sometimes the duck will be startled by this first drum beat. But usually, as it eats the food, the duck will calm down and be ready to try again. For a few trials, the trainer may have to put a bit of food on the paddle, but gradually the amount is reduced so that

after a few trials, the duck is dabbling on the bare paddle. Each dabble is rewarded that makes the drum beat so that it can be heard.

At this point, the duck must learn to DISCRIMINATE, as the psychologist says, or tell when the light is on by the drum paddle and when it is off. During early training stages, the light was on most of the time. Now the trainer turns the light off, and the duck must learn that it does no good to dabble on the drum paddle without the light. Beating the drum while the light is off does not work the electric feeder. Every few minutes the trainer turns on the light. Now if the duck dabbles on the paddle hard enough to beat the drum, it will receive a reward.

After the duck has learned to strike the paddle quickly with a good, hard stroke when the light comes on, the trainer now asks the duck to beat the drum more than once for each reward. The trainer starts by requiring the duck to beat the drum twice for each bit of food, and then quickly moves to a VARIABLE RATIO schedule, sometimes asking for two beats, sometimes for four, and sometimes for six, or only one beat for each food reward. Once the duck has built up good strong drum-beating responses on such a schedule, the last stage of training has been completed. It usually takes about one month to train a Drumming Duck.

The Piano Playing Duck

In the final act, a small signal light is turned on near a lamp on a miniature piano. The duck responds to this light by pulling on a pull-cord to turn on the lamp. Once the lamp is lighted, the duck then dabbles up and down the piano keyboard to play a tinkly tune.

When training starts, the lamp is on, and the cord is not where the duck can reach it. Usually the trainer starts by putting a few bits of food on the keys. When the duck touches the keys to eat this food, the trainer says YES with the electric feeder. On later trials, the trainer gradually reduces the amount of food placed on the keys until the duck is striking or dabbling on the bare keys.

At first the trainer rewards any strike or dabble at the keys, soon only those which depress the keys enough to make a sound.

When the duck is hitting the keys hard and regularly, the trainer now asks the duck to strike or dabble more than once, and also waits for the duck to respond at different spots on the keyboard. Soon the duck is dabbling up and down the keyboard with considerable strength. The trainer always tries to reward the duck while it is actually "playing" the piano; otherwise the duck might learn to play a few notes and then stop to wait for the food.

When the duck is reliably striking the keyboard at several locations, hard enough to play the tune, the next training step is started. The duck must learn to turn on the lamp itself. In order to do this, the small signal light by the lamp is turned on, the keys are covered, and a few bits of grain are taped onto the pull-cord. The trainer may also jiggle the cord a bit to call it to the duck's attention. As soon as the duck starts to dabble or pull at the grain, the trainer tells the duck YES. Gradually the amount of grain placed on the cord is reduced until the duck is pulling on the bare cord. This response is always trained with what the psychologist calls CONTINUOUS REINFORCEMENT; that is, EVERY strong pull on the cord is rewarded.

Now the signal light is turned on, the keys are uncovered, and the duck is required to pull on the cord to light the lamp, then play the piano the required number of times to earn its reward. Here we have connected or CHAINED two responses together -- pulling the cord and dabbling on the keys.

The final step is to teach the duck to pull at the cord only when the signal light is on. The duck must learn what the psychologist calls a DISCRIMINATION ;when the light is on by the lamp, pulling the cord will light the lamp and the piano playing will work the feeder. If the light is off, nothing works, and the duck will not be fed for cord pulling or piano playing. The trainer teaches the

duck this discrimination by leaving the light off part of the time and letting the duck become discouraged at trying to play with no light (remember EXTINCTION?). After a while the duck learns to wait for the signal light before pulling the cord and playing.

When the bird has put all this together, we have a completely trained Piano Duck. The training of a Piano Duck may take from two to three months.

TRAINING AN IQ ZOO RABBIT

Rabbits are a kind of rodent, related to rats and mice. Rabbits are plant eaters (vegetarians) and feed on grass, roots, and parts of trees. Rabbits are usually timid and slow moving. Sometimes though, a rabbit will defend itself, its home, and its young; and a frightened rabbit can run very, very fast. Rabbits must be handled carefully so as not to frighten them; it is difficult to train a frightened rabbit.

IQ ZOO rabbits are a special kind called "Dutch belted." Dutch belted rabbits are more active and colorful than most. This breed is easy to raise and smaller than the large New Zealands, Belgians, and other rabbits raised for meat production. Dutch belted are common in most areas of the United States.

Even though rabbits are slow-moving, the training program is much the same as with other animals. When the rabbit does the right thing, you say YES with the feeder. Even though the rabbit will often times be slow going to the feeder, the rabbit hears the feeder very well and knows what it means.

Rabbits have some of the same kinds of behavior that chickens and ducks have. As their means of PROGRESSION, they walk (hop), run (very fast hopping), and jump; of course the way in which they walk is a bit different! A rabbit can also scratch, but it scratches with its two front feet in quite a different pattern from the chicken's

scratch pattern. The rabbit also can bite, tug, and pull with its mouth.

The Fire Chief Rabbit

This show includes a progression and pulling response. The pulling response is much like the motion rabbits in the wild use to peel the bark from small trees. The Fire Chief Rabbit action takes place in a small area which includes a holding room for the rabbit and a rabbit-sized fire truck, equipped with a special lever. The rabbit must leave its holding room, go to the fire truck, stand in the truck, and pull a lever three to seven times to be rewarded.

A feeder conditioned rabbit is first taught to mouth and then pull a lever shaped and mounted just like the one of the show equipment. The trainer usually dabs on the lever a little wet, mashed up rabbit food. In short order the rabbit is pulling on the lever. The wet food mash is usually used only on the first day. The trainer rewards the rabbit for every pull for about a day or so. The rabbit must then pull two times, then three, then all the way to seven pulls, to earn its reward.

In the early stages of Fire Chief training, the electric feeder is placed close behind the rabbit, so the rabbit doesn't have far to go for food and also so the rabbit doesn't get "lost" between the lever and the feeder. As strange as it may seem, rabbits have very poor eyesight and can quickly lose their way in unfamiliar areas. If the feeder is moved too far too fast, the rabbit becomes confused and may get lost and frightened and quit working.

Once the rabbit is pulling the lever several times and going to the feeder about two feet away, the rabbit is introduced to the final Fire Chief Rabbit enclosure, complete with opening door, lights, bells and sirens. Now when the door of the holding area opens, fire bells ring. When the rabbit pulls the lever, the siren sounds until the rabbit leaves the truck to return to the holding area. The rabbit must get used to all these new sounds; also it may take several weeks of rehearsal for the rabbit to know where

everything is located relative to everything else. It is very important that in all rabbit IQ ZOO acts, all parts of the equipment are exactly alike in position and in size. If one fire truck is longer than the one the rabbit learned to work on, or if it is placed at a different angle on the "road," or if the door of the holding area opens in a different direction, the rabbit will become very confused and not perform very well until it again becomes used to this "different" Fire Chief setting.

It takes about three to four months to train a new young rabbit to be a Fire Chief Rabbit.

The Kissing Bunny

When you see this series of behaviors in final form, the Kissing Bunny comes out of its little house, hops along the fence (a PROGRESSION), reaches up to the top of the fence (another PROGRESSION), and "kisses" a plastic "girlfriend" over the fence (a licking or chewing behavior: MANIPULATION).

At the beginning of the training, after the rabbit is feeder conditioned, we lower the face of the plastic "girlfriend" rabbit to floor level, and place the feeder very near the face. Usually we put a bit of wet mashed feed on the lips of the plastic rabbit. We place the rabbit near the feeder. When the rabbit touches or licks at the lips of the plastic face, we sound the electric feeder to say YES. After a few trials like this, we do not put mash on the lips but just wait for the rabbit to "kiss" the plastic girl-friend. Usually the rabbit will quickly go to the plastic face and perform. Now we raise the face a few inches. The rabbit then kisses the plastic face at the new height. When the rabbit has been rewarded a few times at this height, we again raise the face. And so we continue until the face is raised to the desired height.

Once the plastic face is at the proper height, we begin to move the feeder towards the rabbit's house, a few inches at a time. Finally, when the feeder is in its final position inside the house, and the rabbit has learned to go

back and forth between the plastic face and the feeder, the show is complete. It takes about two to three months to train a Kissing Bunny.

Charlie Chance

In this show, the rabbit leaves its house, hops to a large fortune wheel (a PROGRESSION), spins the wheel several times (a scratching or digging behavior -- MANIPULATION), then returns to its home.

After feeder conditioning, we teach the rabbit to go to the fortune wheel, which is drum-shaped and covered with a rough rubber coating. The rubber coating helps the rabbit get a grip on the wheel. Usually we place a bit of wet mashed feed on this rubber coating. The rabbit eats this, then normally starts to scratch for more. The instant the rabbit scratches, we sound the feeder to say YES. The feeder at this point is very close to the fortune wheel.

Soon the rabbit will be scratching with both feet on the fortune wheel. The trainer begins now to reward only scratching motions which move the wheel a bit. After the rabbit receives several rewards for slight movements of the wheel, the trainer then starts to reward only those scratchings which move the wheel at least once around, and then twice, and so on, until the wheel is really spinning. This, as you no doubt remember, the psychologist calls DIFFERENTIATION.

When the rabbit is spinning the wheel vigorously, the trainer begins to move the feeder away from the wheel, back towards the rabbit's house, a few inches at a time. When the rabbit has reached the stage of spinning the wheel around several times, hearing the YES signal in its house and returning there to eat regularly, training is complete. Charlie Chance is a difficult act to train and may take up to four months or more.