

The Shape of Things to Come

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Abstract

There are two main ways that we train new behaviors: One strategy is to catch the animal in the act of performing the complete behavior and reinforce it, called capturing; another is to differentially reinforce successive approximations toward a final behavior. This strategy, called shaping, is one of the most important training tools in our training bag. Behaviors that an animal might never perform on their own can be taught using this technique. We can use shaping to teach animals to do anything we can imagine within their biological limits; from eating new foods and playing with toys, to voluntarily participating in their own medical procedures. Within this strategy, there are several key elements to understand and master in order to use it successfully. This paper will explore the skills and steps necessary to use shaping successfully in your training programs.

The Shaping Tool

While training a behavior by capturing can be quick and simple to do, some behaviors happen at a low frequency or not at all. That's where shaping a behavior is a necessity. Shaping is a training strategy that uses differential reinforcement of successive approximations to teach a final behavior. Differential reinforcement is the process of reinforcing only selected occurrences of a behavior and not others, based on changing criteria. Through this process of differential reinforcement selected forms of the behavior are strengthened and those that are not selected by reinforcement are weakened. Successive approximations are a series of graduated sequences that lead to that final behavior.

If we break a behavior down into those small steps, or *approximations*, we can teach an animal to do something it has never done before. For example, if you would like your parrot to wave its right foot, there are many intermediate behaviors that have to happen before the foot is raised, and each one of those can be reinforced. First, the parrot's weight needs to shift onto the left foot, then the right foot might move slightly, then lift just a bit, then lift higher and higher. As each one of these intermediate steps is reinforced, you create momentum and can selectively, or *differentially*, reinforce closer approximations toward your goal, while ignoring previous forms of the behavior. Behavioral momentum occurs when you have created an environment where the animal is engaged in learning and behaving at a high rate. If your communication is clear at this point, you will have many opportunities to positively reinforce approximations and this momentum will carry you further through your shaping plan.

The possibility of behaviors that we can shape in our animals is amazing. This tool is useful to train new behaviors with our companion animals, animals in the zoo industry, and even the

people in our lives-- after all, humans are animals, too! We are all designed to have variability in our behavior; therefore behavior is never repeated exactly the same way. If you closely observe the animal you are working with, you will notice that there is variability in its behavior, both subtle and obvious. The more you learn to recognize these subtle variations, the more efficiently you will be able to use the shaping tool. It is this natural variability with which all behavior is performed that we use to capture the next approximation-- the key is to be able to recognize this variability when it occurs and use it in your training (catch it with reinforcement).

Skills Needed to Shape New Behavior

Once you have developed a shaping plan, there are a number of skills necessary to understand and master in order to be successful when shaping a new behavior. As you begin reinforcing approximations, one of the most important requirements is to use a high rate of continuous reinforcement. Continuous reinforcement is a schedule of reinforcement in which each behavior is followed by a reinforcer (1:1). Using this schedule at a high rate will keep the animal engaged in the activity; often called “keeping the animal in the game.” Finding a high value reinforcer for your animal that can be delivered easily and consumed quickly will help you and your animal in the shaping process.

It is then important to recognize that as each approximation is performed without hesitation, reinforcement is withheld for that approximation and only delivered for the next approximation closer to the goal behavior. This is how the behavior begins to take shape. Using the parrot waving as an example, once the parrot has performed the step of shifting its weight to the left foot without hesitation, that behavior no longer earns a reinforcer. The criterion for reinforcement now shifts to the next closer approximation toward the wave, which is movement of the right foot. When slight movement of the right foot is performed without hesitation, reinforcement is withheld for that behavior, and criterion for reinforcement shifts to a slight lift of the right foot. And so the path continues until the right foot is being lifted to fit your criteria.

For many trainers, one of the most common challenges is determining how much to increase your criteria from one step to the next. This can be highly individual to the trainer, the animal and to the behavior being trained. In some shaping plans we can make large jumps in approximations, others may require much smaller steps. For instance, when teaching a hawk to fly to your glove a distance of 20 feet, you may be able to make five-foot steps and accomplish the goal in only four repetitions. However, some birds may require two-foot steps and take 10 repetitions to accomplish the 20-foot flight. Keeping a close eye on your animal’s behavior and body language will help you see if the sizes of your approximations are appropriate. If they are, you will quickly move through those approximations with clear communication. A mistake made all too often is taking too big of a step. If you aren’t achieving the next level of approximation you are looking for, you may have taken too big of a step and experienced a breakdown in communication. When this happens, you can always go back to your previous successful approximation and take a smaller step to regain that momentum and help you move forward.

Another important factor in your shaping plan is the timing of the shift to the next step. One of the simplest ways you can determine when it is time to shift to the next approximation is when you see that the animal has performed the current step without hesitation. This is another place to put your observational skills to work. Your hawk may need to do four repetitions of a five-foot long flight to gain the confidence it needs to do that flight without hesitation. If you change too quickly from one step to the next, or, if you take too big of a step by asking for a longer flight than is comfortable for the bird, the behavior might “crash”. The hawk may not fly at all. In this event, you can take a step back in your approximations and do a couple shorter flights to get the behavior back on track. As the hawk performs the shorter flights without hesitation it will gain some behavioral momentum that may propel it beyond the approximation it stalled out at moments before.

Moving too slowly from one approximation to the next can also be a problem. If you change too slowly, the learner can “freeze” on the current step, making it harder to move on. For instance, if you do too many flights at the identical distance the bird may get stuck in that pattern and have trouble moving on to even a slightly longer flight. When this occurs, you may need to reinforce even smaller approximations than you ever imagined to get the behavior moving forward again. These small approximations create behavioral momentum and keep the animal in the game. They also improve communication with the animal and create more opportunities to reinforce approximations (keeping the rate of reinforcement high). When we take too big of a step, we risk confusing the animal, slow progress, and lose opportunities for positive reinforcement. This leads to a loss of momentum and, ultimately, slows down your shaping process.

It is important to be comfortable relaxing your criteria and going back to a previous approximation if you aren't making forward progress. The shaping process is like the elasticity of a rubber band. Picture a rubber band that you stretch too quickly, with too much force: It snaps. Picture a rubber band that you hardly stretch at all: It stays the same shape. Now picture a rubber band that you carefully and gradually stretch and relax over and over, increasing the force you use to stretch it each time. After a while this rubber band will stay expanded at rest. Keep this rubber band pictured in your head as you are shaping behaviors.

The ability to relax criteria and go back in your approximations is one of the benefits to shaping a behavior versus capturing it. When a captured behavior breaks down, or *extinguishes*, there is little more to do than wait until the behavior reoccurs, hoping you are there to reinforce it. When a behavior that has been shaped breaks down, you can return to the approximations that shaped it in the first place and retrain the behavior. Often times, this process goes much faster since the animal already has history with the approximations.

Steps to Shaping a New Behavior

The first step to shaping a new behavior is to specify the final behavior. Identify what it will look like and the criteria to be upheld. Next, identify the intermediate steps, or the successive approximations, which will lead to the final behavior. Having this plan clearly visualized in your head will help you be more successful. It is important to be flexible in your training plan though-- remember that each animal is an individual, and as you begin shaping, another path that

could be clearer might present itself. Be comfortable taking that path, especially if it will help the communication between you and your animal improve.

Once you have a plan, set up your environment to maximize success. Make sure that the animal is comfortable in the environment and distractions are minimal. An ideal environment would be one where the animal has the power to escape, meaning it can choose to move away from the trainer, choosing not to participate in the session. With this type of set up, the trainer must rely on the use of positive reinforcement and have extremely clear communication. Once the environment is set up for success, it is important to set yourself up for success. Have your reinforcers and any props that you might need ready and on hand. This will ensure that you can surf the wave of behavioral momentum without interruption. As you begin training and reinforcing approximations, train at the animal's pace. Once the animal successfully performs the current step without hesitation, move on to the next approximation. If the animal is having trouble with the current approximation, remember that repetition builds confidence. If you see hesitation, stay at that approximation and allow the animal to repeat it. Each time a behavior is repeated and it is positively reinforced, the animal will become more confident with that level of behavior, leading to more fluency in the performance of the behavior.

Finally, when you have reached your goal behavior, it is time to put the behavior on cue. By giving the cue, also called discriminative stimulus (s^D), while the behavior is occurring you begin to establish a connection between your cue and the behavior. You then shift the timing of the presentation of the cue to just as the behavior starts. This can be tricky for many. You will need to rely on your keen observation skills to notice the precursors your animal shows just before it is about to perform the behavior. Gradually begin to deliver the cue earlier and earlier, until you are at the point where you present the cue before the behavior occurs. Once you are at that point, differentially reinforce the behavior only when it is performed in response to the cue, while ignoring all other occurrences of the behavior. With this step you establish that criteria for reinforcement is contingent upon performing the behavior in response to the cue.

Prompts are anything a trainer does that encourages the animal to perform the behavior. Prompts can be audible, visual, or gestural. Some common prompts many trainers use are verbal encouragement, baiting or luring the animal by visually showing the reinforcer, and using our body to gesture to or manipulate the animal. For example, you can show a parrot a peanut to encourage it to fly to your hand, or say the word "hello" to encourage a parrot to mimic the word. Prompts are often an important part of our shaping process; they help the animal understand what it is we are asking them to do. However, prompts can muddy the waters of clear communication. An important step in the shaping process is to fade your prompts as soon as you can. In some instances, the animal can be so focused on the prompt, such as a piece of food or a gesture from trainer, that it doesn't realize what behavior it is doing that earns the reinforcer.

The best communication between animal and trainer occurs when there is one cue that evokes a behavior. It is helpful if you gradually remove prompts from your training so that the cue alone leads to the behavior. Just like with the timing of shift in approximations, keep in mind the timing of fading prompts. If you fade prompts out too quickly, your behavior may "crash". When this happens, bring your prompt back in and take steps to fade it a bit slower or less

obviously. If you fade too slowly, the animal may become dependent of the prompt. In this case, take small steps to fade your prompt, focusing on the cue you have chosen and being very clear with your criteria for reinforcement.

Final Thoughts on Shaping

Shaping is one of the most valuable training tools in our training bag. Paired with positive reinforcement, shaping techniques can take you and your animals to new levels of behavior and communication. A successful shaping plan can allow a new behavior to be trained faster than you ever imagined. It can also encourage an animal to be a willing, creative, and enthusiastic participant and create relationships between animal and trainer that are extremely rewarding.

Here are some key points to remember: Be observant. Recognize the subtle changes in the behaviors being offered to help you move through your approximations. Shaping should be elastic, like the rubber band. Be comfortable being flexible with your training plan, relaxing criteria, and bringing prompts back in and out. Put all of these things together, and most importantly, have fun shaping!