Shaping a Reliable Hover Behavior in an American Kestrel

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Presented at IAATE, Redding, CA 2018

Introduction

As professional bird trainers and educators, we are always trying to find ways to form stronger connections between our audience and the natural world - through the use of avian ambassadors. This team approach (human and bird) becomes an even more effective tool when we're able to demonstrate a particular species' unique or interesting behaviors for an audience. These behaviors provide context, helping the audience understand and appreciate the bird's place in the wild, even when being admired on the stage. For the American Kestrel, a notable behavior seen in the wild is the mid-flight "hover" utilized while searching for prey.

The goal of this paper is to outline the process we used for shaping a "hover" behavior in a male juvenile, wild-hatched, non-releasable American Kestrel (AMKE) -- as well as the variety of other behaviors he offered along the way. We will also address the additional positive-reinforcement training we have been doing throughout this "hover behavior" work, including self-loading and unloading with his overnight and travel crates and hand to hand flights to keep recall strong. Finally, we'll discuss the training challenges and roadblocks that arose in the process, and how we turned them into opportunities for creative training solutions.

Our training goal was to shape the initial behavior he offered us - "*take and carry a paper ball*" into "*hover above the cuing hand until the paper towel ball is tossed into the air for you to catch*". In the beginning, the ball itself was reinforcing for him, and a powerful motivator, so we had success using this to shape approximations of "types of flight" towards "hover" before his ball catch. Our eventual goal was to train (and chain) a separate behavior into the catch routine--bringing his trainer the ball in exchange for a mealworm, so that we would be able demonstrate it repeatedly with little latency between catches. A secondary training goal was to slowly introduce him to all of the other things an educator gets to deal with, from small travel crates to strange visitors.

The Setup

We want to begin by stressing that we started by selecting this individual because he had the potential to be "**the right bird for the job**." His disposition and history were such that he had a high likelihood of being capable of experiencing a high quality of life as an education

ambassador. Because we feel that empowerment is a significant contributor to quality of life, this individual has been trained with predominantly positive reinforcement, does not wear jesses, and has lived a life full of choices and options (*except that he does not have the option to unload himself from his overnight crate.*)

From day one, AMKE demonstrated a willingness to participate in his training--it was very easy to reinforce him with mealworms, and he quickly understood the idea of a target behavior using a finger point with minimal luring. His lack of fear response to humans is what originally brought him to us, and complications during his initial examination in the clinic resulted in him losing a talon on the hallux of one foot. We decided very early on to handle him by offering a perch on the open palm of the hand--it was much easier for him to get a solid grip without a gauntlet involved, so we allow him to perch on a flat palm as many psittacine trainers do. It has allowed him to become very confident in his landings, often racing from across the room to come to a brain-jarring halt on the edge of our fingers, tiny talons gripping tightly but not piercing the skin.

In order to set him up for success, we utilized our office as his training arena, as it has a high ceiling and the space necessary for him to get exercise. This set up had the secondary benefit of allowing him to get very comfortable with the hustle and bustle of clumsy humans walking around, dropping things, and knocking things over. A variety of suitable perching options were provided around the room to give him lots of choices for a safe landing if he got overwhelmed. These consisted of natural tree branches, as well as astroturf-covered perches like those we use in our outdoor aviary spaces and on our scales. A large crate was prepared with a variety of natural perching options, as well as astroturf covered blocks and a bath pan. We positioned the crate so that it was against a window, meaning that he had a direct view to the large rose bush and bird feeder just outside--enrichment for times he needed to spend in his crate.

Shaping the Target Behaviors - Pre Bridge

Once we established a solid trust-based relationship and reliable target and recall behaviors, we introduced the “catch” object--a small ball of white paper towel. It was presented slowly, he showed interest and no fear, and quickly grabbed it with his foot, flying around the room. He eventually perched and began enriching himself by ripping it to shreds and we had our “aha!” moment. Paper towel balls were fun for him, reinforcing, in nearly limitless supply, and safe (once we ensured he wasn’t ingesting, just shredding.)

The next phase, catching the ball from the air, was as simple as giving him lots of opportunities. By basically playing “catch” with one hand, tossing the ball up a few feet into the air to catch it again when it fell, we elicited the initial catch behavior after just a minute or less of

observation on his part. He came zooming down from a high perch across the room, grabbed it with his feet, flew back to a perch, landed, and predictably proceeded to rip the ball to pieces. When he was confident with the routine and we started running out of paper towel, we decided it was time to move on to the next stage of the shaping process.

At this point, we conditioned a ***bridge/event marker/secondary reinforcer*** in the form of a whistle. We needed to be able to capture his behaviors from a distance, as we were now moving away from behaviors that occurred at/near the trainer like recall or weighing on a scale. We paired delivery of mealworms and bits of prey items over the course of his training sessions, multiple times per day. Though a straightforward process, we ran into a bit of a hurdle. With multiple trainers working with him at this point, we found that as a team, we needed to get consistent with our bridging. Initially, AMKE would seem to have been successfully conditioned to expect reinforcement after the bridge, but then that understanding would be absent inexplicably as he ignored the whistle and presented reinforcer. Much akin to "rubbing your tummy while patting the top of your head," a task requiring a form of mental gymnastics and timing, the art of conditioning a secondary reinforcer takes practice! When we all got dialed in with the timing of our bridges and presentation of reinforcers, as well as getting 100% consistent with using the bridge whenever reinforcers were delivered, it became a very effective tool in shaping the next part of the behavior: returning with the ball to the trainer's hand after a successful catch.

Shaping the Target Behaviors - Post Bridge

Up until this point, the ball itself was reinforcing the catch behavior. We needed to build his understanding of the connection between catching the ball and the appearance of different novel reinforcers, so that we could train him to return with the ball and "exchange" it for a primary reinforcer like a mealworm or piece of mouse. In order to accomplish this, we broke the behavior down into two parts--first, catching the ball and returning to the hand, and second, letting go of the ball when standing on the trainer's hand with it - aka "the trade."

We trained the second behavior in the chain first, simply by waiting until he held the ball standing on a perch. We'd passively hold the ball in place, and when he stepped off of it, we captured that. Then, we practiced repetitions of offering the ball, having him take it with his beak or foot, and reinforcing when he dropped it. After he understood "letting go of the ball" yields positive reinforcement, it was very easy to generalize that "drop" behavior to the hand, when he was recalled while clutching a paper ball in his foot.

With all of the parts of the final behavior being offered reliably, it was time to put it all together. We tossed the ball and on a catch, we immediately bridged and presented both the

open palm and the reinforcer--variable in type. When he returned to the hand he would eat the visible reinforcer, and as soon as he let go of the ball we'd bridge again and reinforce for the drop. At that point, we would either cue him back off to a perch to reset, or throw the ball while he stood on our left hand.

Our current goal is to increase the frequency with which he brings the ball to the hand immediately after the catch without a detour to another perch first. Currently, he still decides to detour to a perch about 75% of the time before coming to the hand with the ball. We'll be ready to provide higher value reinforcers and small jackpots for the desired approximation, should he offer it.

But What about the *Hover Behavior*?

Despite the initial training goal being to focus on a hover behavior specifically, things didn't work out quite as planned. During the initial stages of training when he first started catching the ball mid-air, we found that if a trainer tossed the ball up a short distance a few times like they were warming up--until AMKE "went for it" - *then* that trainer *hesitated* on the TRUE toss it- would elicit a beautiful hover behavior as he waited a few feet above the ball, ready for the true toss he knew was coming. We tried to work on this behavior, but the problem was two-fold. First, it was very easy to be a clumsy human and mess up the cue (the warm up tosses) which would lead potentially to a "miss" on his part. We eliminated this problem by working in a cue--waving the ball in a tight circle instead of making "warm-up" tosses. The second problem wasn't so easily fixed.

Because we had no way of capturing his attempted hovers (no conditioned reinforcer/bridge at this early stage,) the lack of successful catches appeared to discourage him from being ready to try again. Successes, on the other hand, seemed to keep him engaged with subsequent repetitions. We decided to be flexible when we realized we needed to work backwards towards our final behavior, establishing all of the things that occurred AFTER the catch before we could work on what came BEFORE the catch.

Now that we have spent the last three months focused on building reinforcement strategies, his skill in the air, and enthusiasm for his training sessions, we'll be returning to shaping the "hover" pre-catch. We're confident that we'll be able to capture the approximation of flight we're looking for with an audible bridge. At that point we'll start to generalize to other indoor environments as well as his outdoor aviary, on exhibit for guests.

Concurrent Secondary Training

In order to train at his pace and respect his attention span, we always had a variety of options for him in terms of opportunities for positive reinforcement. If he "tuned out" of a ball catch session, we'd give him time to do some bird watching up on a high perch, and then offer a different behavior - recall to the hand, self-loading into a small travel crate, targeting to various perches, or hand to hand flights. Not only did this variety keep him interested in participating in training, it also allowed us to build the skills he would need to be an education ambassador, aerial-acrobatics aside.

Travel crate training was done by initially reinforcing on the hand while we moved around the threshold of the crate, with a lure (aka bait) on the perch inside. After a few sessions of being "near" the crate opening, he hopped right in, ate his reinforcer, and we followed up by bridging and offering additional reinforcement. He could always leave when he wanted, but we focused on cueing him back to the hand before he decided to leave on his own, to keep loading/unloading on stimulus control from the get go and not let him practice "bailing" from the crate. Door opening and closing was done in a similarly sensitive fashion by increments, then once he was comfortable with that we did short moves with door closed and high value reinforcers when they opened again. After a couple of months of this being a daily option and exercise, he was happily loading, having the door closed, and being transported in a completely empowered fashion.

The talon on the hallux of his left foot eventually grew back, but twisted like a corkscrew and pointed upwards. In order to ensure he wouldn't develop a problem due to overgrowth, *we worked the use of an emery board into training sessions*. With one trainer acting as the platform and reinforcing, the other trainer is able to gently file his talon while supporting his toe. It has allowed us to make some real progress towards keeping his talon growth under control. He also allows us to trim his talons with nail clippers, but the risk of quicking and the discomfort that would cause makes the team hesitant to take the risk outside of a wellness exam, sans restraint. The need for real trimming will be re-evaluated on a periodic basis.

Training Challenges

Imperfect Training Environment

The first challenge was setting up a suitable training space that would allow us to minimize variables in the environment. His outdoor aviary wasn't completed yet and we needed to get creative for AMKE's evaluation and training--pending construction of his mew. We de-

cluttered our high-ceilinged office space, colored with paint markers on the windows, and set up a variety of perching near windows to help prevent him from perching in undesirable locations, e.g., picture frames. The name of the game was OPTIONS. We also made the small travel crate part of the environment from day one--even when we weren't using it, he was getting used to seeing it and being near it. Thankfully the active passerine population just outside AMKE's window kept him endlessly entertained, providing excellent passive enrichment during the quiet non-training times.

We did need to get creative with people entering and exiting the office, since "flying out the door" would have been an *undesirable behavior*. Utilizing D.R.I (differential reinforcement of an incompatible behavior,) we established a routine of going into the travel crate for a very brief few seconds on cue, long enough for the office to be secure again. Originally he had only been loading infrequently, so all it took to strengthen this behavior was increasing the frequency with which we asked for the behavior, keeping duration short and reinforcement rate high.

Short Attention Span

Second, we found that his attention span was...limited, to say the least. Easily distracted, the office was an enriching environment full of interesting objects and windows all around, through which he could see birds at the nearby feeders. In this respect, we were aided by the fact that his temporary training and living space is our office--it allows us to offer a high number of very short training sessions throughout the day as we are doing other desk work. Watching for his attention, we tailored the timing of the training sessions to his interest, initially working on recall- then ball catches, self-loading into a small travel crate, and a few other behaviors. Just a few repetitions of a behavior, then back he would go to "bird watching." Letting him choose the length of his sessions kept things moving along at his personal optimal pace.

Reduced Novelty/Value of Reinforcers

When we started getting more focused with AMKE's training, we fell into a common trap--the overuse of a high value reinforcer without varying the reinforcer type. For AMKE, mealworms were a high value and easily handled reinforcer, but after a time of using them exclusively on a bridge he stopped responding to cues. To address this, we changed up our reinforcement strategy in two ways. First, we started varying the quantity and type of reinforcer that followed a bridge. The possibilities became a mealworm, a darkling beetle, multiple mealworms, or pieces of mice and quail. Second, we introduced a new food type--day old chick (DoC.) After one training session in which he received random pieces of fluffy yellow DoC as well as mealworms as usual, his motivation to perform the desired behaviors increased markedly.

Weight *vs* Diet *vs* Delivery Management

We found that creative delivery of a measured diet throughout the day during training sessions allowed us to keep his motivation for training high, while still being sensitive to what his body needed for healthy growth and feather development. He received mealworms, small pieces of mouse/quail/DoC and larger chunks (i.e., jackpots) periodically, offered in the context of training sessions. For example, in order to keep his crate loading behavior strong, we were sure to always give a jackpot of some kind as a reward--generally something like a quail/mouse head, presented between two small block perches so that he couldn't see what was there until he actively chose to go inside. Smaller pieces of reinforcer were delivered during training sessions, to avoid him "taking a break" and flying off to eat his food somewhere else in the room.

As to how MUCH of a diet he was getting, we made that decision by combining species-specific natural history data, his behavior, his daily weight in grams, his interest in food items, and his willingness to participate in operant training. This allowed us to hone in on a healthy weight without depriving him of food. He was given a very large diet while we did initial scale training, and as we monitored his weight we noticed that he showed a marked lack of interest in mealworms or bits offered in training after gaining ten grams. Without anthropomorphizing, we generally assume that if you wave a delicious looking half mouse at a Kestrel and he tucks his foot up and rouses, it means he's feeling well-fed. Having collected this data, we felt comfortable adjusting his daily diet of mealworms mice, quail, and DoC so that he maintains a weight near his "seasonal threshold," for lack of a better word. This is re-evaluated on a daily basis, and the data is catalogued in our database for reference.

Next Training Steps

The next big change in AMKE's life will be transitioning to an exhibit mew, outdoors, while still participating in training sessions throughout the day. At Cascades Raptor Center, our education ambassadors are housed on exhibit when they are not helping us with formal programs. This effectively allows them to engage and educate visitors to our site in a passive fashion throughout the day, creating memorable experiences in an informal context. The travel crate we've designed for AMKE will be used to transport him between the office and his aviary, remaining in his aviary with him until he is ready to move again. This will ensure that he is secure and comfortable during the transition with a familiar option (his crate) always near at hand. Initially he'll spend part of the day outside, under observation, still staying indoors at night. Eventually, depending on his comfort, he'll stay in his outdoor aviary the majority of his time, when he's not participating in training or educational programming. Interacting with and educating visitors to our site is an integral part of what our education team does, but we

introduce the birds to this lifestyle slowly by setting up rope barriers a generous distance from a new bird on exhibit. As time passes and the individual in question gets more comfortable, we gradually return the barriers to their original locations.

We will also be addressing safety equipment in the near future, and we are considering the choice between traditional jesses or aylmeri anklets. At the Cascades Raptor Center, we generally favor permanent, grommeted anklets (aylmeri) with removable jesses that we thread through the grommets for each training session. We've found that many residents are most comfortable with this system, which allows them the most freedom from tripping as they move around their enclosures. We introduce threading the jesses slowly, counterconditioning with high rates of reinforcement the whole way, ensuring each individual in question is comfortable with us manipulating the equipment near their feet. Most recently, with new residents, we've been using a style of anklet that allows us to attach and remove them completely after each session (false aylmeri.) This, however, requires a very confident and comfortable bird, four hands, two trainers, and a very high rate of reinforcement during the initial stages. *It is worth the extra effort required!* This is likely the method we will use for AMKE as we move forward towards the next stage of his training as an education ambassador.

Flying Into the Future on the Wings of a Kestrel

We've done our best to create a strong foundation for this young American Kestrel, promoting confidence, resilience, and a sense of empowerment most animals in human care struggle to achieve. Our tools are trust-based relationships, creative application of positive reinforcement, patience, and flexibility. Our work as a training team, however, is only effective thanks to the confidence and enthusiasm possessed by this particular individual AMKE. As we move forward, learning new behaviors and generalizing old behaviors to new trainers and environments, we're confident that he will be resilient to the unexpected things that inevitably happen in the life of an educator. We're also confident that our experience with this young raptor is one that can be replicated by other creative trainers in our field--as long as they choose the right bird for the job.