

Studying the One

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Through our work with Dr. Susan Friedman of BehaviorWorks we, at Natural Encounters, Inc. (NEI), often reference the saying “behavior is the study of one”. But what does this phrase mean, and how do we strive to include it into our daily tasks?

This paper will discuss the importance of identifying and understanding individuals, especially as it pertains to applied behavior analysis and free-flying flocks of mixed species macaws. Trained to fly half a mile one way and back at a major theme park in Central Florida, these flocks of on average 25 macaws are seen by thousands of guests daily, with the hope that the interaction inspires future caring and conservation action. In the last six years, NEI has trained over 150 macaws to participate in this extraordinary experience and consequently have encountered some unique challenges, especially the identification of individual birds. For example, trainers at all levels need to be able to correctly identify individual birds amongst others in the flock, within a few seconds, countless times throughout the work day. Senior staff especially need this critical skill in order to make split-second, important training decisions which have an effect on future individual bird and flock behavior. So how do staff members even attempt to track so many individuals without saying ‘Who the flock are you?’ and why is the study and understanding of “one” so important?

It has become very important amongst zoological facilities to properly identify individuals within collections for welfare, genetic, and research value (D. G Ashton, 1978). Marking techniques have evolved, but can still include painting, branding, tattooing, ear clipping, insertion of medical chips or-telemetry equipment, ear tagging, banding, and more. Additionally, identification of individuals may also be based on their natural variations in size, color, shape, or patterning. A common practice to identify individual birds, both in the wild and under human care, is through the application of a plastic or metal leg bands engraved with a unique set of letters and/or numbers. This technique is a relatively error-free form of identification when the animal is in hand or within range of a person’s eyesight. However, we often need to identify an individual at distance where reading a band, even with bionoculars is impossible. Additionally, here at NEI, for the safety of our free flying flocks, the majority of our birds’ bands have been removed to prevent possible entanglement hazards, which happens far too often with banded birds. Additionally, all birds are internally microchipped. However, without a chip reader in very close proximity to the bird, it is a poor option for identifying individuals. So, how do trainers accurately identify individual macaws within a large flock? When

this free-flight macaw program started in 2014, it was common practice to put a small drop of pet safe colored nail polish on a feather located on the back or side of a macaw in order to identify birds. Often the polish would last a few months, so application training was not maintained, and when remarking was needed a “head in the bucket” approach for stationing the animal during reapplication was often used. This is when the animal, or bird in this case, is distracted by eating food out of a bowl and is unaware of the approaching stimulus. This is not a recommended strategy, and may be recognized by some as a quick and dirty approach that may reach one’s goal quickly, but with little communication to the animal, reduced learning opportunities and poor set up for future repetitions. Furthermore, this approach sometimes resulted in paint marks that were larger than intended if the animal moved or became startled during application. Another issue that arose was the effect the paint had on the feathers themselves. Before application, tests were done on molted feathers and revealed no resulting damage. However, post-marking it was noted that on areas where paint had previously been applied on birds, there was sometimes thinning or small holes on the feather, and on occasion the feather barbs sometimes had become separated. The use of polish worked and was easy to visually use as an identifier, but with the highest level of animal welfare as our guide and goal, trainers wished to explore cleaner and safer alternatives. The solution: simply getting to know the birds as individuals better, by really looking for their natural similarities and differences in morphology and behavior.

Our first level of identification is always at a species level, based on the known colors present in both males and females of a naturally occurring wild population. At NEI, our macaw flocks may include hyacinth (*Anodorhynchus hyacinthinus*), great green (*Ara ambiguus*), green-winged (*Ara chloropterus*), military (*Ara militaris*), scarlet (*Ara macao*), blue-and-gold (*Ara ararauna*), blue-throated (*Ara glaucogularis*) and red-fronted (*Ara rubrogenys*) individuals. Depending on the project, we may have several flocks of between 20-30 macaws, each generally consisting of 6-8 species, and often including multiple members of each species. In **Image 1**, you can see multiple military macaws with their trainer, Shanna G, who has taken the time to master the skill of being able to identify each individual bird by their physical attributes. In **Image 2**, you can see a military macaw next to a great green macaw on a scale. Both individuals are primarily green with red cere feathers, and at a quick glance, look quite similar. However if given further study and key species specific information, most people can successfully spot their noticeable differences. For example, the great green is more of a lime or brighter shade of green and larger in size, while the military macaw is smaller and darker in color. Similar confusion can also occur when comparing blue-and-gold and blue-throated macaws.



Image 1. Working with multiple members of the same species can be very challenging. Here you can see trainer, Shanna G, has learned to not only identify the six different military macaws in front of her, but also countless others not pictured. Once IDs are mastered, a trainer can successfully identify an individual within a few seconds of looking at them.



Image 2. Here you can see the differences, side-by-side, between the great green macaw on the left and the military macaw on the right.

Mastering individual bird identification requires staff to analyze and memorize a large amount of fine details. To complicate things further, individual trainers may then choose to focus on different physical attributes to use when they identify individual macaws. Commonly, the natural identifiers we use most often are any “unusual” morphology (sometimes seen in toes or feathers), beak shape, pattern or size (see **Images 3 and 4**), the patterns in cere and/or lateral facial feathers and nare size or shape. For example, in **Image 5**, there are noticeable differences in the patterns of a few tiny, black feathers amidst the red cere feathers when comparing two military macaws. However, dependence on this marker becomes increasingly difficult when the bird is wet (**Image 6**). Due to the sheer size of information regarding characteristics and individuals, we have found it very beneficial to document the birds through photos and group chats. This also serves as a very important tool when it comes to teaching our new staff. Unfortunately, some of the natural identifiers listed above are not permanent due to natural growth, like the unusual yellow feathers seen in **Image 7**, which can be subject to change overnight due to natural molting. Therefore, it is very beneficial to have a large team of skilled staff who each use different physical characteristics to identify the birds. They can then communicate alternative markers to identify individuals when other key identifiers are lost. Communication is crucial and helps to save teams from frustration when this occurs.



Image 3. Comparing the similarities and differences in the ventral, black maxillary beak stripes of Rex and Jessie, scarlet macaws.



Image 4. Comparing the similarities and differences in the dorsal, black maxillary beak stripes of Bernadette and Raj, two green-winged macaws.



Image 5. Comparing the similarities and differences in the red and black cere feathers of military macaws, Pans and Yosemite. Pans (on the right) has equally thick, flat lines of both red and black, while Yosemite (on the left) has two small black "squares" within his red.



Image 6. *Red and black cere feathers are not reliable characteristics to use to identify wet military macaw individuals, as seen here after a rainshower.*



Image 7. *Unusual yellow feather morphology on the tail and shoulder of two separate blue-throated macaws. Identifiers subject to change overnight due to natural molting.*

Another aspect to consider is the position or activity an individual will be doing when the identification is needed. An animal hanging upside down while in close proximity to the trainer versus an animal with their back turned at a distance, each shows different views and therefore potentially different individual physical identifiers. For example, in a show setting where reinforcers are being physically handed to a bird,

the antecedents of this act will naturally direct the bird's face towards the trainer, so a focus on facial characteristics seems most ideal.

Identifiers such as trained cues, relationships to other birds, or traits should not be used as primary individual indicators, but as good back-ups to reaffirm predictions. Because behavior is influenced by its environment, a well established cue performed without hesitation in one setting may not occur at all in another (S. G. Friedman and L. Haug, 2010). In the case where a bird is sick or nervous, using a behavioral cue to identify an individual could also be prone to error. Additionally, solely using weight data to identify individuals should also be avoided and used only to confirm predictions, as these are subject to change daily, seasonally, and with weight and diet management.

The phrase coined by Dr. Susan Friedman that "Behavior is the study of one" acknowledges that each animal is an individual with their own likes and dislikes. What works for one individual may not work for another of the same species. This may be most clearly understood when examining our own lives. Consider one's favorite food item, and their least. Without knowing them as an individual, someone would only be able to make generalized guesses at what they might find reinforcing or punishing for behavior. To further complicate things, these preferences may change overtime due to experience. However, unlike in the restaurant world, in the zoological field trainers and keepers cannot simply ask our animal coworkers verbally which food reinforcer they would prefer on a given day. Instead, by setting up a two-way dialogue between trainer and animal through positive reinforcement and a keen eye on an animal's individual behavior, we are able to better hear their "voice" and get insight about their individual preferences.

Successfully identifying and understanding an individual allows us access to a wealth of personal information. This information gathered not only helps to provide better welfare to the animals under human care, but also has applications to understanding their wild counterparts. Accurate knowledge of current and past weights, diets, age, health, reproductive and medical history, relationships, genetics, final training approximations, and more all contribute towards the overall success of managing the animal as an individual. Asking questions about conspecifics, past training and medical history, and recording this biological data will help to form a more complete picture of the individual. This knowledge of such information becomes even more crucial when it comes to the advanced and unique behavior of free-flying birds. Constantly faced with constraints and challenges, successfully training birds to free-fly across long distances takes a keen understanding of the science of behavior change, the weather (both future and current conditions, such as rain/wind/heat and their effect on a bird), the individual bird and their behavior within the flock, the bird's health, past history, and weights and general ornithology. At any moment, all aspects of the previously mentioned are being

constantly evaluated by trainers, while staff also continuously survey environmental antecedents and make split-second decisions based on bird behavior. Regardless, even with a “perfect session” and a great understanding of all of these elements, birds can still choose to fly away, which is probably the biggest challenge people who free-fly birds face and is not a concern that has to be considered in most other aspects of animal care in the zoological field. All animals are individuals and have the right to say “No,” but unlike other animals in a zoo or aquarium, birds can fly out of training situations and sit in a tree for a number of hours, sometimes even days. Here, knowing the bird on a very individual level can be crucial. For example, knowing what ‘friends’ a flock animal like a macaw is bonded to and generally spends most of their time with can be very important in getting that animal home safely and quickly in the event of separation due to a fly-off. This past year, we explored using an audio recording of a sibling’s contact call broadcasted over a wireless speaker, and found it worked well to identify the location of a young military macaw named Hiro during a fly-off, eventually helping to prompt him back home. Certain birds may also have “favorite” spots they return to routinely while on fly-offs. Of course, the success of all of this first on the trainers being able to correctly identify who from the flock is missing and recall past individual bird history accurately.

In the early stages of training more than 150 macaws to fly long distances in large flocks, every bird starts by training first at the individual level. Before ever flying outside, individuals must learn and become proficient in the basics, like voluntary step-ups, crating, and basic flight skills. Once added into smaller flocks, daily data is still collected on individual birds, like their successes and failures, as we continue to evaluate them on skill level and provide an individualized training plan for each bird. This evaluation continues through to adulthood, as behavior is fluid and even though “mastered” can break down due to a variety of different reasons. Again, team communication and proper identification are crucial in these moments, as setbacks and behavior breakdowns if caught early enough will have little to no effect on the rest of the flock’s goal behavior. These training decisions often are also made quickly and in the moment, which requires highly-trained staff to make decisions based on the individual bird and the understanding of the science of behavior change principals. It is the responsibility of the training team to set up each individual bird with information and experience to make them safe, successful learners, and to continue to gauge success throughout their lives based on within our company through our understanding that it is the study of one.

References

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