

IS IT TRAINING OR IS IT ENRICHMENT?

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ABSTRACT

The practice of enrichment surely dates back to the earliest days of animal caretaking. Yet, the "field" of enrichment is a relatively new one. Ten years ago, institutions with even informal enrichment programs were a rare commodity. Today, many of the world's zoos, aquaria, and laboratories have formal enrichment programs as part of their animal management plans. With this ever-increasing interest in enrichment, some confusion has arisen with regards to its definition, objectives, scope, and principles, specifically with respect to the relationship between enrichment and animal training. Most would agree that both are critical components of an animal's captive environment. This paper reviews definitions of both enrichment and training, discusses the pertinent terminology in these two areas, and explores the animals' possible motivations in each. In short, the paper discusses both the enriching aspects of training and the training aspects of enrichment.

Key Words: environmental enrichment, animal training, reinforcement, captive animals

INTRODUCTION

In both training and enrichment scenarios, a stimulus is presented in the animals' environment and behavior may occur as a result. This simplistic view of both scenarios gives the erroneous impression that enrichment and training are synonymous. Indeed, in both formal and informal contexts, the authors have encountered the terms "enrichment," "training," and "reinforcement" used interchangeably.

The following definitions highlight the primary distinction between training and enrichment—choice. "Learning can be broadly defined as a change in behavior resulting from practice or experience; when practice or experience is dictated by humans, the process is called training" (Mellen and Ellis, 1996).

Enrichment has recently been defined as "A dynamic process which structures and changes animal environments in a way that provides behavioral choices to animals and draws out their species-appropriate behavior and abilities, enhancing their animal welfare" by the Enrichment Working Group of the Behavior and Husbandry Scientific Advisory Group of the American Zoo and Aquarium Association (AZA/BHAG, 1999).

The authors acknowledge that there is considerable overlap (or "gray areas") between

the enrichment and training scenarios. It is our belief that these gray areas support the concept that training is enriching for the animals involved. This overlap is also primarily responsible for the confusion. However, it is important that animal care professionals be intimately familiar with the concepts involved to establish and maintain quality enrichment programs. While training can be a highly enriching experience for the animals in our institutions, an enrichment program consisting primarily of training opportunities is not a well-rounded program. The purpose of this paper is to offer clarification of the definitions and concepts of these interconnected terms.

With this goal in mind, the following components of both training and enrichment are discussed: stimulus; window of opportunity; behavioral response; and reinforcement. Each of these components and the connection among them will be discussed within two similar scenarios—one training scenario and one enrichment scenario.

Training Scenario

At Disney's Animal Kingdom (DAK), an on-going program with 0.3 Asian tigers (*Panthera tigris* spp) serves as an example to illustrate the concepts in this paper. As part of the training program at Disney's Animal Kingdom, the tigers were trained to perform a variety of species-appropriate behaviors on cue in view of our guests. The tigers were first trained to scratch a log that was placed in their off-exhibit area in response to the sound of a doorbell (discriminative stimulus). As a targeting aid, the doorbell was mounted on the log, where the trainers wished the tigers to scratch.

The specific behavior shaped was to scratch a log with both paws while standing on the hind legs. The tiger was asked to continue scratching until bridged (using a dog whistle) at which time, the tiger received a food reward (meat). After the tiger responded to the doorbell cue by leaving an adjacent enclosure, move to the enclosure with the log, and scratch the log, the next approximation was trained.

The next approximation was to have the tiger perform the same scratch behavior on a deadfall tree in their exhibit. The doorbell was mounted to the deadfall and upon hearing the cue the tiger was reinforced (meat) for standing on its hind legs and scratching on the deadfall tree until it was bridged.

Enrichment Scenario

Each morning, before the remaining 0.3 Asian tigers are released into their exhibit, various scents (elephant feces, tiger urine, camel wool, clove, and Angel Fire perfume) are placed on a deadfall tree in the tiger enclosure. The type and number of scents varies from several to none on any given day. Occasionally, a new log is added to the area, which may or may not be scented.

Stimulus

A stimulus is defined as a measurable event that may have an effect on behavior (Kazdin, 1994). In the training scenario above, the stimulus is the doorbell and it has become connected to the reinforcement through the training process. Thus, it is called a discriminative

stimulus or “S^d.” This is the case with the vast majority of training programs. Other than in transitory scenarios, it is rare that trainers will use numerous S^ds to elicit the same behavior(s). In fact, this one-stimulus, one-response concept is a basic tenet of most, if not all, training programs. Thus, a training success occurs if the animal exhibits the one “correct” behavior when the stimulus is presented.

In the enrichment scenario, the caretaker may intend that the animal responds to enrichment with a specific behavior, but generally the goal is to elicit any of a range of behaviors (e.g. investigatory behaviors). Placing Angel Fire perfume on the deadfall tree has resulted in numerous behaviors including: scratching, rolling, urine-spraying, body and cheek rubbing, biting, vocalizing, sniffing, and ignoring. Thus, with enrichment, the animal may express a variety of behaviors in response to the same stimulus, and, depending on the enrichment goal, any one of those behaviors might be considered an enrichment “success.”

The enrichment scenario also differs in that the animal may exhibit a given behavior in response to a variety of stimuli offered independently or concurrently. For example, any of a number of scents (e.g. allspice, clove, conspecific urine), and possibly other stimuli, such as stripping or adding bark or other novel textures, may result in bipedal tree scratching.

One could argue that some enrichment strategies include changes to the environment that cannot truly be identified as a stimulus for a behavioral response. Rather, they are more accurately characterized as an opportunity to express behavior in response to a natural, internal behavioral “need.” These needs may be hormonal, seasonal, comfort, territorial, hunger, etc. The enrichment simply provides an appropriate environmental opportunity to express those behaviors. In an enrichment scenario, the animal may or may not respond overtly to a particular stimulus. By definition, in a successful training scenario, the animal will respond to the discriminating stimulus given.

Window of Opportunity

The term “window of opportunity” refers to that period of time that the animal has the opportunity to express behavior and earn reinforcement. Several aspects of this window are pertinent to the discussion: duration and frequency of the window(s); amount of time for behavioral response; consequences of non-response; and which party determines these aspects.

Also, there are two “windows of opportunity” to consider—the amount of time allowed between stimulus and behavior and the total duration of the session. Both of these tend to be short in duration in the training scenario. In the tiger example, a training session may last up to 30 minutes and within that time, a trainer will usually look for an immediate response to the stimulus. Once the session ends, the animal no longer has the opportunity to earn reinforcements that day.

In the enrichment scenario, the scent is left in the exhibit until it dissipates naturally—a period of several hours to several days. The tiger has the opportunity to respond to the scent any time during its on-exhibit hours.

In the enrichment scenario, it is the animal that determines both the duration and frequency of the interactions. Often, an animal expresses interest, moves away from the enrichment, and returns one or many times throughout the day. Preliminary observations on 1.1 giant pandas (*Ailuropoda melanoleuca*) indicated that it was unusual for the first interaction to be the longest or only interaction observed even with familiar items (Hare, 1999, pers. obs.).

The frequency of response is often higher in the training scenario (e.g. a tiger may be asked to scratch bipedally many times in the course of a session); in the enrichment scenario any one tiger may utilize the scented area only two or three times. However, it is important to note that in the enrichment scenario, it is the tiger that determines how often and how long to interact with the scented area. If the tiger chooses to interact with the scented area repeatedly, she has the opportunity to do so. Presumably, she has met her needs within those two or three interactions and eventually loses interest. In contrast, the trainer, not the tiger, dictates the frequency and duration of the interaction during a training session.

An often neglected but important part of the window of opportunity concept is the consequence of non-participation. Whether in a training or enrichment scenario, an animal may choose not to participate. However, there are important differences between the motivating factors of the two scenarios.

In both scenarios, an animal may choose not to participate from the start of a session or lose interest at any point within the session. In the training scenario, if an animal chooses to ignore the trainer or to exhibit an unwanted behavior, it is common practice for the trainer to ignore the unwanted behavior thereby assuring (as much as possible) that the trainer does not inadvertently reinforce these undesirable responses. This limits the window of opportunity for the animal to choose to participate and supports the one-stimulus, one-response goal of a typical training session.

In contrast, this one-stimulus, one-response situation is not the goal of enrichment programs. Generally, enrichment items are added to the environment and left for an unspecified or long period of time. It is rare that the stimulus is removed if the animal chooses not to respond or responds in an undesired manner—although two exceptions do come to mind. First, safety concerns may cause an enrichment item's immediate removal if the animal is exhibiting behavior deemed dangerous or unhealthful. Second, some enrichment has intrinsic limitations to its availability (e.g. lure courses). In these situations, like training scenarios, the animal can learn that the window of opportunity closes if the animal doesn't act.

Finally, trainers generally determine when to end a session based on the animal's response. That is often when the animal appears to be losing interest and/or when they have accomplished a specific goal. Many trainers strive to end a session on a "positive note." But, the fact remains that it is primarily the trainer who ultimately decides the length, frequency, and shape of the windows of opportunity.

In enrichment scenarios, the window of opportunity tends to be much wider than in training scenarios and all aspects of this window are controlled primarily by the animal. Indeed, some enrichment items allow the animal to actively control the window of opportunity. That is, if the animal "turns it on" the enrichment will occur, regardless of other factors. Hal Markowitz is well known for pioneering such scenarios and others have designed similar systems as well. For example, Myers (1978) designed a paddle system for jaguars to manipulate to gain access to small food items. In such scenarios, the window of opportunity is potentially unlimited.

Behavioral Response

In the training scenario the exact behavioral response (shape, degree, and duration) is dictated by the trainer. Certainly, in the early stages of training, less specific behaviors are

accepted. But ultimately, the goal of the training process is to achieve a very specific response for a very specific stimulus. The tiger in the above example is expected to approach the tree, stand bipedally and scratch the tree until instructed to stop. Any other behavioral responses are not reinforced.

In the enrichment scenario, the animal determines the shape, variety, duration, frequency, and degree of its response to the enrichment offered. In the tiger example, the tiger may choose to approach the tree and scratch as in the training scenario. However, the tiger may choose to express other behaviors, such as rubbing the tree or area surrounding the tree with cheek, head, neck, and body; flehmen; and biting (all of these behaviors are associated with scent-marking and self-anointing). Or she may choose to roll onto her back in the nearby area, vocalize, or any number of unanticipated behaviors. Finally, the tiger may opt to approach the tree numerous times, and each time she may choose to exhibit a different behavior(s). The tiger also has the choice to determine the length, intensity, and sequence for these behaviors.

Finally, the issue of the animal's voluntary participation is clearly one of the aforementioned gray areas. Trainers and enrichers alike commonly state that the animals have the option not to participate. However, this is not completely true in either scenario.

Trainers use a variety of techniques to capture and hold their animals' attention. These include: choosing to work with the animals when they are hungry; changing the schedule of reinforcement or increasing the reinforcement offered; requesting simpler, more familiar tasks; altering the order of behaviors requested; and lowering the criteria necessary to earn reinforcement.

Enrichers also "stack the deck" to encourage interaction with enrichment items offered. A common example is to use food as motivation to attract animals to novel non-food enrichment items. In general, the concept that an animal can truly ignore a change to its environment may be suspect. Captive animals are surely quite familiar with their environments, and changes, such as those made in the name of enrichment, may well be impossible to truly ignore. Just because one tiger does not exhibit any overt interest in the perfume does not guarantee that she is truly ignoring the scent. She may be aware of and responding to that scent in a manner that is less obvious to human observers.

Although both enrichment and training scenarios have similar difficulties with voluntary participation, the authors believe that the enrichment scenario generally offers the animal more choice concerning participation. Although the tiger may not be unaware of the perfume, we must "consider one of the important lessons of ethology; that animals do not necessarily attend to all the stimuli that they are capable of perceiving" (Robinson, 1998, p. 160). As a rule, in situations that would undeniably qualify as enrichment scenarios, the animal has been presented with the choice of whether or not to respond to the enrichment.

Reinforcement

"Positive reinforcement is anything which, occurring in conjunction with an act, tends to increase the probability that the act will occur again" (Pryor, 1985, p. 23). For the purposes of this discussion, there are three types of positive reinforcement that we will call "food", "inherent", and "process" reinforcement. Food reinforcement, as the name implies, refers to a food reward earned by the completion of a task. Food is the most common reward offered in training scenarios. An example of a food reward in an enrichment scenario is the place-

ment of food in puzzle feeders. In both scenarios, the reward is determined and provided by the person, rather than the animal.

Inherent reinforcement refers to other, less obvious internal reinforcement received, presumably by the expression of a behavior. For example, it seems reasonable that a wild tiger receives reinforcement (territoriality) for scratching a tree and leaving her visual and olfactory marks behind. In the enrichment scenario, the tiger, in effect, chooses her reinforcement through the selection of the behavior(s) expressed. In the training scenario, there is some question as to whether the tiger would experience inherent reinforcement, but it is clear that the trainer, not the tiger, selects the type and amount of reinforcer given.

Process reinforcement refers to what is often called "satisfaction in a job well done." Most would agree that animals, like people, are rewarded by successfully resolving a challenging problem. Laule (1992, p. 12), acknowledging "the subjective and somewhat anthropomorphic nature of her statements," states that, in her experience, animals "'enjoy' the [training] sessions, they 'want' to work, they 'like' to succeed. Most recognize that this process reinforcement is a hallmark of a successful training program. Process reinforcement is also prevalent in many enrichment scenarios, such as when solving cognitive and manipulative challenges presented by puzzle feeders.

The Connection

The connection among stimulus, response, and reinforcement is also a consideration. In the training scenario this connection is devised by the trainer and is usually outside the boundaries of a naturally occurring context. That is, the stimulus may be quite different from one that a wild tiger might encounter (e.g. doorbell) or, if encountered, it would not be expected to elicit the same response (e.g. bipedal scratching). In addition, the reinforcement (e.g. food) may not be appropriate for the behavior expressed. The sound of a doorbell (an unlikely sound for a wild tiger to encounter) may result in the tiger exploring the area, staring, or even jumping (if startled), but it is unlikely that this "naive" tiger would stand bipedal and scratch a log upon hearing a doorbell. Further, upon doing so, it is unlikely that the tiger would be fed.

The trained tiger has been conditioned to respond to the doorbell with bipedal scratching, in anticipation of earning a food reward. Thus, in the training scenario, the tiger's primary motivation to bipedally scratch is to earn food, an out-of-context reinforcement earned for expressing a behavior inappropriate to a conditioned stimulus.

During the enrichment scenario, the connection more closely approximates that within a naturally occurring context. For example, wild tigers certainly encounter conspecific and other, novel, scents. In response, the tiger may scratch over scent and derive inherent reinforcement by satisfying a territorial "need."

In the enrichment scenario, a zoo tiger also responds to the scent with stimulus-appropriate behavior (sign-posting, scratching, rolling, rubbing, vocalizing, flehmen) and receives reinforcement derived from the expression of the behavior itself. Thus, her motivations are connected to the behaviors expressed and the reinforcements earned: to satisfy territoriality needs, tree-scratching, cheek-rubbing, and urine-spraying behaviors may be expressed; rolling may fulfill comfort needs; and vocalizing may occur in response to her excitement upon discovering an unusual scent. Thus, in the enrichment scenario, the tiger responds in a stimulus-appropriate manner and experiences response-appropriate reinforcement.

CONCLUSION

In general, the stimuli, windows of opportunities, behavioral responses, and reinforcements are generally more tightly defined and are controlled by the human in training scenarios. In enrichment scenarios, each is dictated by the animal. In addition, the enrichment scenario often provides a more species-appropriate connection between each of these components. Given these differences, it is reasonable to conclude that the animal's motivation differs between the two scenarios.

Motivation explains "why a stimulus has different effects in different situations and why behavior seems to be goal-oriented" (Mellen and Ellis, 1996, p. 89). During a training session, the animal's motivation is to interact appropriately with the trainer and earn rewards. In an enrichment scenario, the animal's motivation is directly connected to the enrichment offered and deriving its inherent and/or food reinforcement. Thus, while closely related, "enrichment" and "training" and "reinforcement" are NOT synonymous terms or concepts.

Simply stated, the difference between training and enrichment programs is control. With enrichment, the animals have the opportunity to make choices concerning their environment and the behaviors they express. "Providing animals with broad contingencies and allowing them to 'invent' ways to use them led to interesting and varied behavior rather than excessively redundant stereotypic outcomes. Engineering ways in which animals can control some aspects of their environment should, we believe, always be done with the goal of allowing the animal to decide when and, as broadly as possible, how to use these opportunities" (Markowitz and Aday, 1998, p. 55-56).

Regardless, it is important to note that training scenarios do address each of the components in an enrichment scenario. Thus, training, as commonly practiced in zoos and aquaria, confers many benefits, including facilitating the visitor experience, education, and medical and husbandry procedures, and is most certainly enriching for the animals involved. As stated by Poole (1992, p. 208), "In captivity, the satisfaction which animals gain from achieving a goal is appreciated by anyone who has trained them. Animals as diverse as rats, walruses, elephants, and chimpanzees gain satisfaction from achievement, quite apart from the actual food reward. The most intelligent species show clear evidence of pleasure in simply completing a task successfully."

In addition to the satisfaction of a job well done, training can be used to complement enrichment programs as a tool to teach an animal to utilize an enrichment device or to facilitate shifting to allow more flexibility in enrichment programs. However, a training program, in and of itself, does not constitute an entire enrichment program. An enrichment program should contain appropriate strategies selected from the entire enrichment pie, not just the slice we call training.

Just as Poole (1992, p. 217) states that "We must get away from the idea that one piece of equipment represents 'environmental enrichment'," we must acknowledge that a training program cannot offer the animal the full scope of opportunity, motivation, control, and reinforcement available in a comprehensive enrichment program. In addition to those enrichment benefits attained through a training program, a truly comprehensive enrichment program should include:

- **Opportunity:** The animal is presented with the opportunity to express species-appropriate behaviors and abilities.

- **Motivation:** The animal is motivated internally as to if, and how, it will utilize the opportunities provided.
- **Control:** The animal is given control over if, how, when, and to what degree it will utilize those opportunities.
- **Connection:** The motivation, stimuli, response, and reinforcement will be connected in a species-appropriate manner.

“Enrichment is clearly an important task for us all. It means, quite simply, that we should ensure that the animals in our care have the greatest possible opportunity to satisfy their behavioural imperatives, and to express their full range of natural behaviours. If we succeed in this task we will all have more interesting zoos, with more humane conditions” (Robinson, 1998, p. 170).

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