

# Next Level Training: Seminar #3 at the Ranch



This document contains the notes for all the topics planned for discussion at the Ranch seminar: *Next Level Training*. Please note that Ken constantly updates his seminar presentations to reflect current science knowledge and best practices, thus these notes may not be exactly the same as what you will see live. Additionally, the benefit of attending a live seminar is the flexibility it affords Ken to adapt to questions and attendee interests – for those and other reasons, topics may be added or deleted at the last minute. Several of the notes in this seminar are more extensive than what is presented live. Ken’s notes on Non-Food Reinforcers contain extra information on the evaluation of reinforcers that was not presented live. Additionally, his notes on Concept Training generally include topics that are not presented live, Ken will pick which topics to present based on student interest – there is not time for all topics to be covered, but the notes are still here for your use.

## Personal Philosophy

### Introduction

- CEU's
- Housekeeping
- KR Background
- Personal Philosophy

### Define Training

- Training = Teaching

### Cornerstones of Animal Care

- Health Care – VETERINARY PROGRAM
- Nutrition – FOOD & VITAMINS
- Environment – INCLUDES SOCIAL STRUCTURE
- Behavior Management – TRAINING & ENRICHMENT

### Primary Reasons for Training

- Physical Exercise
- Mental Stimulation
- Cooperative Behavior
- Animal Welfare – These things all directly benefit the individual animal and assure that animal welfare is the top priority

### Secondary Reasons for Training

- Education
- Research
- Conservation
- Entertainment
- Work Animals
- Sport
- The list goes on . . .

### Philosophical Foundation

- Laws of learning apply to all animals
- I am first and foremost a practitioner – but I also believe in the importance of the science
- Training is not a luxury – it is a key component to good animal care

# Non-Food Reinforcement

## Topic Description

Reinforcement is the key to successful training, as most trainers already know! However, there are many different reinforcement strategies and reinforcement options available to trainers: consistent schedules, intermittent schedules, life rewards, toys, play, food, treats, etc. The mythology around how various schedules of reinforcement work can mislead trainers into using a strategy inappropriately and lead to frustration for the animal and the trainer. Many trainers fail to approach new reinforcement strategies systematically, which can be the reason why certain strategies seem to fail. This class will explore both the science behind these concepts and successful methods for implementing different types of reinforcement into a training program. We will also discuss techniques for evaluating whichever approach you choose.

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## Introduction

- Define smart reinforcement
- Delivery of reinforcement
- Substitute reinforcers
- Reinforcement strategies
- Evaluating reinforcers

## What is Smart Reinforcement?

- Effective reinforcement
- Produces desired results
- Maintains a comfortable animal
- Maintains behavior long-term

## Novel Reinforcement

- Novel, unexpected, or surprise reinforcers can make an event memorable.
- Potential to be very reinforcing
- Also has potential to be very aversive
- Use with caution and knowledge
- Systematic introduction of reinforcers removes the surprise but increases overall effectiveness.

## Systematic Reinforcement

- True success at most training endeavors depends on thoughtful approximations
- Advanced reinforcement is no different
- Important concepts
  - Reinforcement Substitutes
  - Schedules of reinforcement
  - Reinforcement Variety

## Definitions

- Primary reinforcer – Inherently reinforcing, satisfies a biological need
- Secondary reinforcer – acquires its reinforcing value through association with primary reinforcers

### Types of Conditioned Reinforcers

- Secondary Reinforcer = Conditioned Reinforcer
- Event marker – Bridging stimulus (clicker, whistle, “good”, etc.)
- Keep going signal, intermediate bridge (discussed in complex tool class)
- Tertiary reinforcers
- Reinforcement substitutes – a learned reinforcer used in place of primary reinforcement from time to time.

### Reinforcement Substitutes

- Conditioned or learned reinforcers used in place of food
  - Clapping
  - Toys
  - Tactile
  - Play
- Train them like a new behavior
- Success depends on four main factors
  - Reinforcement history
  - Relationship
  - Implementation
  - Experience (knowledge, observational skill, evaluation)
- At times misused – making assumptions about what an animal likes
- Only effective if taught systematically
- An important step in providing variety (more options when reinforcing)

### Training Step-by-Step

- Pick stimuli that will be useful in training
  - Something easily available
  - Can be something the animal already seems to “enjoy”
  - May also be novel or insignificant stimuli
- Train each new stimuli (“future reinforce,” “new reinforcer,” or “reinforcement substitute”) as a behavior
- Present new stimuli; follow with primary reinforcer
  - Continue until it is clear animal accepts new stimuli
- Easy well-established behavior; click; new “reinforcer”; primary reinforcer
- Behavior; click; new “reinforcer” only; cue; next behavior; click; primary reinforcer (max 3x per session)
- Harder well-established behavior; click; new “reinforcer”; primary reinforcer
- Hard behavior, click, new “reinforcer” only (max 3x per session)
- Increase use in session gradually (never allow % of reinforcement substitutes to outweigh primary reinforcers – 20/80 max)
- First steps toward “variable schedule” of reinforcement

### Rules for Beginners

- Never use a reinforcement substitute after two consecutive behaviors
- Avoid using same reinforcement substitute twice in succession (if you have multiple options)
- Always ask for behavior followed by primary more often than a substitute

- Continue to use reinforcement substitutes as a behavior more often than as a reinforcer

#### Notes on Premack

- Premack Principle – high probability behavior can be used to reinforce low probability behavior
- My translation – an easy behavior can reinforce hard behavior
- In essence that's what we are creating when we train reinforcement substitutes

#### Advanced Reinforcement Notes

- Can a reinforcement substitute become a primary reinforcer?
- How do you choose an appropriate reinforcer?
  - Individual
  - Time of day
  - Satiation level
  - Task difficulty
  - Health
  - Many other factors
- Experience needed to evaluate well
- Never take reinforcement for granted

#### Schedules of Reinforcement

- Looking at it simply
  - Continuous (consistent)
  - Variable (intermittent)
- Advantages to the use of variable schedules of reinforcement
  - Potential to strengthen behavior
  - Work long duration without treats
- Disadvantages to using variable schedules
  - Can lead to frustration
  - Not effective unless systematically introduced

#### Implementing a ~~Variable Schedule~~ Reinforcement Variety

- Reinforcement variety not technically a variable schedule
- Examples of successes and failures
  - Search & Rescue Dogs
  - Agility Dogs

#### Why does it all Matter?

- Systematic introduction of variety = teaching an animal to accept variety
- An established relationship is critical
- Experience at reading your animal = evaluation of reinforcers

#### Notes about "Natural Drives"

- How do natural reinforcers fit into this?
  - Play
  - Prey
  - Social interaction
- Aren't they primary reinforcers



Modified Form (for focusing on reinforcement effectiveness only)

**Reinforcement Evaluation Score**

Date: \_\_\_\_\_ Trainer: \_\_\_\_\_

Evaluator: \_\_\_\_\_

Time: \_\_\_\_\_ Animal: \_\_\_\_\_

Other Info: \_\_\_\_\_

Location: \_\_\_\_\_

Behavior Attempted	Cue Response 3-Immediate 2-Slight Delay 1-Long Delay 0-No response	Behavior 3-Perfect 2-Attempt 1-Wrong 0-No Attempt	Reinforcer Describe what is offered & quantity	Focus 3-Excellent 2-Distracted 1-Left briefly 0-Gone	Score Add score of cue, behavior & focus

Expectations

- Animals will develop expectations about reinforcement
- Learned based on how and when trained
- Often based on value to animal vs. difficulty of behavior
- Expectations can be changed
  - Must be systematic in reshaping
  - Easiest if planned from start
  - Variable use of reinforcement reduces specific expectations

Avoiding Reinforcement Pitfalls

- Don't take any reinforcer for granted
- Never forget basic key strategies (form basis for all advanced concepts)
- Constantly maintain strength of reinforcement substitutes (condition/recharge)
- Evaluate reinforcer effectiveness constantly
- Variety in reinforcement helps as long as expectations are met
- Control access to reinforcers
- Always look at behavior – key to everything

Summary – Conclusion

- Systematic introduction of new reinforcement is important
- Basic concepts, maintenance & evaluation are keys to success
- Relationships are a big part of effectiveness
- Once you understand reinforcers, application becomes easier and more effective.
- That's Smart Reinforcement!

## References

Chance, Paul. (1999) *Learning and Behavior, 4<sup>th</sup> Edition*. Brookes/Cole Publishing Company, Pacific Grove, CA.

Friedman, Susan G. (2008). What's Wrong with this Picture? Effectiveness is not Enough in *Good Bird Magazine*, Vol 4-4; Winter 2008.

Ramirez, Ken (1999). *Animal Training: Successful Animal Management through Positive Reinforcement*. Shedd Aquarium Press, Chicago, IL.

## Additional Information

- Blank **Reinforcement Evaluation Score** form for your use (next page)
- Excerpt from *Evaluating Reinforcement* instructions (following next page)





Excerpt from *Supervisor's Guide to Training Trainers* by Ken Ramirez

**EVALUATIONS**

One of the most important aspects of our job as supervisors is to provide constructive, timely, feedback to each trainer. You are tasked with observing everything from body language, planning, animal focus, cueing, telegraphing, bridging, criteria, reinforcement, behavior selection, variety, use of space, communication with other trainers, and guest perception, to name just a few. Additionally, you are trying to look at big picture issues, training progress, use of tools, problem solving, and other larger issues. You will meet with managers to have training sessions to prepare you for how best to provide feedback. We want feedback sessions to be positive, constructive, and honest. You will be asked to practice giving feedback to a manager, director, or VP several times before being cleared to start giving the feedback yourself.

Our basic evaluation form has not changed in many years. It is designed to give a clear and complete picture of everything that took place in the session. There are objective parameters as well as subjective parameters which allow you to document what the trainer did and how well you feel they handled each activity. The main sections of the evaluation form are below. You should have had plenty of previous experience within our program seeing and understanding the content of this particular form.

+ ✓ Good X-Wrong S-Slow P-Poor ∅-None

Behavior (B) / Activity	Cue		B	Bridge	Conseq		F	Comments
	Qual	Resp	Qual	Time	Qual	Qual	ocus	

The challenge with this form is that it takes experience to complete. One must know our program, our animals, our criteria, our staff, and goals to complete this form. It requires a great deal of experience and knowledge to fill out well – which is why we only allow supervisors or higher to utilize this form. However, in an effort to give younger staff, interns, and volunteers to learn about the value of evaluations, we have created a streamlined form. The new form only focuses on fairly objective variables and is primarily designed to evaluate reinforcer effectiveness. We believe this will be a good learning tool for all trainers and help younger staff begin to get an understanding of the evaluation format.

**REINFORCER EVALUATION**

It should be no secret to any trainer in our program that reinforcement is the key to successful training. We believe that if trainers learn to watch each other and learn to evaluate each other – each trainer will become more effective at providing reinforcement and at evaluating their own sessions. As supervisors we must help young trainers or those learning about reinforcement understand how to use these forms and how to interpret them. Generally, we believe they are self-explanatory to the experienced staff who know our program, but there are several aspects that will require explanation to the newcomer. Here is what the headings on the form look like. Below, we will discuss the meaning of each section and what the rankings mean. We have tried to simplify the intent of each section for new users.

Behavior Attempted	Cue Response 3-Immediate 2-Slight Delay 1-Long Delay 0-No response	Behavior 3-Perfect 2-Attempt 1-Wrong 0-No Attempt	Reinforcer Describe what is offered & quantity	Focus 3-Excellent 2-Distracted 1-Left briefly 0-Gone	Score Add score of cue, behavior & focus

**BEHAVIOR ATTEMPTED**

In this column the observer should write the name of the behavior requested or describe the activity of the trainer. This will require that the observer at least know our S<sup>D</sup>s to be able to write down what was requested. Without that basic familiarity with our cues and our behaviors, this evaluation will be difficult. However, all staff, most interns and most volunteers should know this information. As soon as a cue is given, the observer can write down the behavior requested and move immediately to the next column.

## **CUE RESPONSE**

This section is designed to look at fluency and latency of response to the cue. Our animals should respond instantaneously to a cue, without any hesitation. Once the cue has been given, the observer can immediately score the response as either:

- 3 – Immediate, the response was quick, no hesitation
- 2 – Slight delay, indicates a brief pause, a second of inactivity before responding. Once cue is complete, the observer can count “one – one thousand” – if the animal takes off within that time, it can be scored a 2.
- 1 – If the animal’s response to the cue takes longer than “one-one thousand” we consider that a long delay.
- 0 – Any response taking longer than 5 seconds is considered a no response.

## **BEHAVIOR**

This column does require some knowledge of what the behavior should look like. We are really only asking the observer to indicate correct (3), wrong (1), or no behavior offered (0). However there is a subjective option for those who know the animal and behavior well (2).

- 3 – Perfect – Indicates that the behavior was correct, and that it met criteria (this last element may not be possible for all observers to know).
- 2 – Attempt – This is a subjective category that indicates that the animal attempted the correct behavior, but did not meet acceptable criteria.
- 1 – Wrong – This indicates that the animal offered a behavior, although it was incorrect.
- 0 – No attempt – This indicates that no behavior was offered. Either the animal stayed with the trainer or left trainer to wander – either way, no effort was apparently made to offer a behavior.

## **REINFORCER**

This is not a scoring column, but a place to write down what type of reinforcer is being offered as well as quantity of that reinforcer. This may require close observation by the observer. In some cases the observer will know what reinforcers the trainer has prior to the session starting. If there is only one type of reinforce, the observer may simply write quantity. If observing an experienced trainer, the variety of reinforcers could be large and may include various types of food, a variety of secondary reinforcers, as well as the potential to move on to another behavior. The observer should do their best to track all of these things.

## **FOCUS**

One of the key factors in evaluating the skill and effectiveness of a trainer is in his or her ability to keep an animal’s focus. This is a critical column and one that the observer must be conscious of throughout the session. It is the last column and should reflect focus from the time a cue is given until the next cue is presented. The score at the end of the row should cover that complete period of time. An animal that is motivated and interested in its trainer will maintain eye contact with the trainer, stay at station, and be very responsive. Here are the scores for this column:

- 3 – Excellent – indicates that the animal’s attention never wandered. The animal maintained eye contact and looked at the trainer for that entire time.
- 2 – Distracted – this score would be given if the animal’s attention wandered. They remain at station or with the trainer the entire time but allowed their attention to get pulled away. Perhaps their body’s orientation changed to face another animal or another trainer, but the animal remained “with” their trainer. A momentary eye shift by the animal to look at a sudden appearance of an animal, object, noise, or trainer does not merit a 2 if the animal immediately returned its attention to the trainer – this would be a good thing and still garner a 3. However, any distraction great than that would be a 2.
- 1 – Left briefly – if the animal not only breaks eye contact but leaves station or wanders away from the trainer, even briefly, merits a 1. If the trainer has the animal’s attention even briefly, between cues, the score should be a 1.
- 0 – Gone – this is reserved for those instances when, following an S<sup>D</sup> the animal never comes back, or when it does, the trainer is now setting up for a new cue or a repeat of the last cue. Usually, this would indicate that the animal was gone for more than 10 seconds.

## SCORE

The final column is to add up the score for each behavior at the end of each row. However, the more critical scores are the averages for each column, looking specifically at cue response, behavior, and focus. Interpretation can be rather subjective, however generally the information provided by the average score of a column for a session consisting of at least 10 behaviors can indicate some strong and important trends. Look at the following examples of three different sessions. Let's examine what the scores in each session might mean.

### SAMPLE SESSION #1

<b>Behavior/Activity Attempted</b>	<b>Cue Response</b> 3-Immediate 2-Slight Delay 1-Long Delay 0-No response	<b>Behavior</b> 3-Perfect 2-Attempt 1-Wrong 0-No Attempt	<b>Reinforcer</b> Describe what is offered & quantity	<b>Focus</b> 3-Excellent 2-Distracted 1-Left briefly 0-Gone	<b>Score</b> Add score of cue, behavior & focus
Come	3	3	1 kibble	3	9
Down	3	3	1 kibble	3	9
Roll over	2	3	1 kibble	3	8
Sit	3	3	1 kibble	3	9
Bark	3	3	1 kibble	3	9
Fetch	3	3		2	8
Release	3	3	1 kibble	3	9
Hold/Wait/Stay	1	1	0	3	5
Hold/Wait/Stay	3	3		3	9
Walk Away-2 mins	3	3	5 kibble	3	9
Kennel	2	3	10+ kibble	3	8
Kennel opened			Toy given		
<b>TOTALS</b>	<b>29</b>	<b>31</b>		<b>32</b>	<b>92</b>
<b>Avg Score</b>	<b>2.63</b>	<b>2.81</b>		<b>2.90</b>	<b>8.36</b>

Overall, the session above is a very good session. It consists of approximately 12 behaviors, one of which was repeated twice. Other than the one error, the animal had a nearly perfect session. All three categories averaged over 2.5, two were better than 2.75. The quick interpretation is that behaviors are solid and focus is great. This usually indicates very effective reinforcement. The slightly lower score in the cue response column might indicate that this trainer needs to examine their cues to determine if they are being given correctly. But overall this is a great session. Ideally, we would want this trainer to work with this animal several more times, with potentially longer sessions – this would allow us to accumulate a better average and allow us to see trends.

To assist observers in understanding these evaluations better, on the following pages are several more sample sessions with our interpretations.

SAMPLE SESSION #2

<b>Behavior/Activity Attempted</b>	<b>Cue Response</b> 3-Immediate 2-Slight Delay 1-Long Delay 0-No response	<b>Behavior</b> 3-Perfect 2-Attempt 1-Wrong 0-No Attempt	<b>Reinforcer</b> Describe what is offered & quantity	<b>Focus</b> 3-Excellent 2-Distracted 1-Left briefly 0-Gone	<b>Score</b> Add score of cue, behavior & focus
Bark	0	0	0	2	2
Repeat Bark	2	3	1 kibble	2	7
Sit up	2	3	1 kibble	2	7
Lay down	3	2	0	2	7
Sit	1	2	0	2	5
Bark	2	3	1 kibble	2	7
Go to Mat	2	3	1 kibble	2	7
Come	3	3	1 kibble	3	9
Wave right paw	1	2	0	2	5
Wave left paw	3	3	0	2	8
<b>TOTALS</b>	<b>19</b>	<b>24</b>		<b>21</b>	<b>64</b>
<b>Avg. Score</b>	<b>1.90</b>	<b>2.40</b>		<b>2.10</b>	<b>6.4</b>

This session is pretty much a disaster. Although 6 out of 10 behaviors receive a 3, for well trained animals in a professional training program, this is unacceptable. However, more telling than the behavioral response (which is barely below an acceptable 2.5) is the terribly low score for cue response at 1.9 and a low score for focus at 2.1. The low focus score and below average behavior score is an indicator of probable problems with reinforcer effectiveness. The other possibility could be that the lower focus score may be as a result of some unusual or unexpected distractions during the session. That is why it would be important to do several evaluations to allow the observer to see trends before making a determination based on a single evaluation. Even the best trainers with the best animals can have a low score from time to time – it is never wise to make any assumptions or decisions based on one evaluation.

On the following page is one more sample session...

**SAMPLE SESSION #3**

<b>Behavior/Activity Attempted</b>	<b>Cue Response</b> 3-Immediate 2-Slight Delay 1-Long Delay 0-No response	<b>Behavior</b> 3-Perfect 2-Attempt 1-Wrong 0-No Attempt	<b>Reinforcer</b> Describe what is offered & quantity	<b>Focus</b> 3-Excellent 2-Distracted 1-Left briefly 0-Gone	<b>Score</b> Add score of cue, behavior & focus
Come	3	3	1 kibble	3	9
Sit	0	0	0	3	3
Repeat Sit	1	2	0	3	6
Lay down	0	0	0	3	3
Repeat Lay down	2	3	0	3	8
Sit	3	3	1 kibble	3	9
Fetch	0	1		3	4
Repeat Fetch	3	3		3	9
Release	0	1	1 kibble	3	4
Repeat Release	3	3	1 kibble	3	9
Spin	3	3	1 kibble	3	9
Lay down	3	3	1 kibble	3	9
<b>TOTALS</b>	<b>21</b>	<b>25</b>		<b>36</b>	<b>82</b>
<b>Avg. Score</b>	<b>1.75</b>	<b>2.08</b>		<b>3.0</b>	<b>6.8</b>

This is one of the more perplexing examples of session scores. You will note that the cue response score is very low and the behavioral score is low, but the focus score is a perfect 3.0! Why would this be? Here is an example of reinforcement and/or relationship with the trainer being very strong. The fact that the animal maintained perfect focus, even through some problem responses, is an example of an animal that is “eager to please.” Objectively, based on the 3.0 average focus score, we believe that indicates the animal was highly motivated to remain in the session. The two predominant factors affecting that are usually the reinforcers being offered or the relationship with that trainer (which is a form of reinforcement and is usually based on some type of reinforcement history). As supervisors we would start to focus on many other factors of this trainer’s skill set – cueing, criteria, reasons for repetition – but not on reinforcement. Like with the previous examples, we would want to do multiple evaluations over time to see if this one session was an anomaly. Multiple evaluations over time also helps us look at gradual changes in score, which may indicate a problem that is just emerging or an improvement that is gradually coming into place.

**GENERAL CAUTIONS ABOUT SCORES**

It is important not to read too much into these scores. This process is only a tool. It is not an infallible system and it does not take into account many other variables that could impact the score. This system works within our program because of the controls we put into each session. We find the scores helpful because they give us a relatively objective measure regarding certain factors that we find important. We continue to find that “focus” is a critical factor, particularly when paired with cue response and behavior in evaluating reinforcer effectiveness.

When this system is used by trainers outside of our program, it can still be effective, but certain factors need to be considered and understood.

**CUE RESPONSE** – If animals were not trained to have an immediate response to a cue, the timing of the scores for cue response may need to be changed to match expectations. We expect very fast reaction times, but this may not be true of every program or every species or breed. As an example our dolphins are lightning fast and meet the criteria easily; however our belugas do not move as fast – but we are still looking for them to start their motion toward exhibiting the behavior immediately. A beluga may not get the task done as quickly as a dolphin, but

we do expect a beluga to respond to a cue and begin their movement (however slow) immediately after the cue is presented.

**BEHAVIOR** – For observers who don't know the animal's behavior well (and even for those who do), it is sometimes cleaner to eliminate the score of "2-Attempt" – because it can be reasonably argued that a behavior is either right or wrong, there can be no "attempt". We have chosen to include the "attempt" option because we find that when an animal attempts to do a behavior, but fails to meet criteria, it is worth noting. Although we do not reinforce an attempt, when analyzing the session we have discovered that the fact that the animal tried is significant – its failure to complete the behavior to criteria often indicates other problems that trainer may be having.

**FOCUS** – Within our program, we require our animals to start and end all behaviors at station. Those who do not have this requirement may interpret focus differently – but it is no less important. When setting up observations it is still critical to evaluate the animal's interest in the trainer and focus on the trainer. Any break in focus other than that which is requested is a significant indicator of a decline or decrease in motivation and thus reinforcement.

*Another interesting note about focus:* We refer to focus as being a significant indicator about reinforcement, but it is actually a significant indicator about consequences. We only refer to reinforcement, because that is our consequence of choice within our training program. However, a traditional coercion or punishment based trainer will also have good focus if they apply their "corrections" properly. That focus may include other side effects that point to the negative impacts of coercion-based training – but the animal will be focused. The score will still accurately represent the effectiveness of whatever consequence is being applied.

## **FINAL THOUGHTS ON EVALUATING REINFORCEMENT**

Over the years of teaching trainers and evaluating their performance and progress, we rarely need to use this scoring system. As experienced trainers we are able to give good feedback and assess reinforcer effectiveness through standard evaluations. However, there are those occasions when a trainer desires more objective feedback and this system was designed to allow a non-supervisor to do an assessment. We have tested the objective nature of this scoring system on many occasions by having an average of 10 observers evaluate the same session. The results overwhelmingly indicated a very objective system:

- 81% of control trials produced evaluation scores that were identical (no variation on any score).
- 11% of control trials produced a single point difference in one parameter of only one behavior by only one observer.
- 4% of control trials produced a single point difference in one parameter of only one behavior by three different observers (not necessarily the same parameter or behavior).
- 4% of control trials produced a larger number of point differences – this was from two trials that included 20 or more observers. In both cases the observers were students. Only a handful of students had ever done any training and most were only introduced to the behaviors we were using in the session in passing. However, even under these conditions, more than 50% of the students in each trial matched the instructors evaluation exactly.

We have also found this to be a useful tool for self-evaluation. By videotaping a session, a trainer can watch the session and use the evaluation form when they watch the session at a later time. The most straight-forward way to use these evaluations is to use a single type of reinforcer during each scoring session. The system works with variable schedules and reinforcement variety, but the interpretation of the scores is more complex and beyond the scope of this brief summary. For more information and assistance in interpreting scores, please seek help from a supervisor.

## Perspectives on Scent Discrimination

**Seminar Description** – Dogs are uniquely qualified and talented at using their noses. Ken will explore the training of scent discrimination in a variety of disciplines. He will examine the differences and evaluate the many techniques being used for training dogs to use their nose, taking what he calls “an outsiders look at the inner workings of scent discrimination training.” Ken began working as a consultant in a variety of scent discrimination programs more than 15 years ago – precisely because he had little to no experience with scent training. He was asked to take a fresh look at scent discrimination programs with several search and rescue teams (including disaster, avalanche, and cadaver dogs), as well as several law enforcement programs (including explosive and narcotic detection dogs). This seminar will look at all of these types of scent detection work plus some of the newer uses in sport and competition. Ken will evaluate the many techniques advocated by the various scent discrimination disciplines and examine what the science indicates about each – ultimately looking for the most positive and effective of approaches.

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### Goals

- An overview of scent detection applications
- Share my recommendation for basic training steps
- Review biggest challenges
- Discuss common mistakes or errors
- Share with you my unique perspective

### My Perspective

- Not primarily a scent detection trainer
- SAR training since 1997 – brought in to provide R+ perspective
- Led to consulting with many SAR and Law Enforcement agencies
- Discovered many myths & a focus or reliance on less important aspects (in my opinion)
- Not a critique of individual systems (not productive or helpful)
- Just my perspective from the outside looking in (few trainers follow purity of a single system, share my observations)

### Types of Scent Detection

- Search & Rescue
  - General
  - Disaster
  - Avalanche
  - Cadaver
  - Tracking
  - Similar goals, diverse training techniques, most needing to pass 2 levels of FEMA Certification and thus needing to meet specific criteria. Often candidates train for the test and not the job.
- Law Enforcement/Military
  - Explosive Detection
    - German System
    - RCMP Method
    - Lackland Airforce Base



- All have rigid and inflexible protocols
      - Traditionally based
      - Handlers not allowed to vary
      - Full of superstitious behaviors
      - Each mired in its own set of politics
      - Do produce results
    - Narcotic Detection
    - Tracking
    - Arson Detection
    - Agriculture detection
  - Medical Detection
    - Cancer
    - Diabetes
    - Seizure
    - Many others - new and emerging techniques still being studied and not fully understood
  - Wildlife Detection
    - Conservation work
    - Invasive species detection (including home pests)
  - Sport
    - Hunting
    - Obedience Training
    - Nose Work Sport

#### Today's Focus

- "Teaching" scent detection
- Desensitization (Proofing/Distractions/Obstacles)
- Indication or Alert behaviors
- Reinforcement
- Teaching an "All Clear"
- Will cover each in depth later

#### Important Topics – but not our focus today

- Dog Selection
- Search patterns
- Guiding from a distance
- Obstacle/Agility training
- Tracking: match to sample – find source – get reinforced
- Science of scent detection
- Emergency behaviors (quick down, freeze, recall)

#### Basic Training Sequence

- Train/Determine alert or indication behavior
- Present the scent, cue alert behavior
- Short search for scent
- Dilute strength of scent
- Disguise scent
- Long search for scent

- Search for scent with distractions

#### “Teaching” Scent Detection

- We don’ teach scent detection – dogs already experts at this (Susan Bulanda)
- What we teach is:
  - What to find
  - When to find it
  - What to do when they find it
- In my opinion, easiest part of scent detection work; forms only 10-20% of overall task

#### Desensitization

- In my opinion this is the most complex part of scent work, forming 80-90% of task
- Proofing – Distraction Training – Obstacle Work
- Once alert on scent is well established, majority of time is spent preparing dog for real world scenarios
  - Adverse conditions/Distractions/Obstacles
  - Train alert with great reliability before starting major real world desensitization
  - Set dog up for success in early stages so that he succeeds and task remains enjoyable
  - Ultimately, for SAR and Law Enforcement, dog must be exposed to extreme distractions and taught to stay on task throughout

#### Alert or Indicator Behavior

- Aggressive
  - Avalanche – Some Narcotic Detection
  - Paw at/Dig
- Passive
  - Explosive Detection – Some Sport
  - Sit & Stare
- Report
  - Some Search & Rescue
  - Bark
  - Rope Pull
- Train alert behavior first – then pair with scent using basic fading procedure
- Teaching an “All Clear”

#### The “All Clear”

- A behavior that indicates the absence of target scent in search area
- Not common, but something I strongly advocate
- Very successful where used – not part of most law enforcement systems (but a great help for those that use it)
- Allows animal to be reinforced at completion of every requested search
- Virtually eliminates false alerts

#### Training an “All Clear”

- Same process as training the indicator alert
- Once indicator is well established/reliable, teach the “All Clear”
- At end of search of a clean area; pair completion with a new/different alert

- Start with clearly defined area – such as a row of boxes or bags
- Move on to search of an entire room, row of cars, clearly fenced in yard, etc.
- Expand size of search areas as dog learns how you define parameters
- Alternate real hide searches with clean area searches
- Make sure that reinforcement for all clear has same value as an alert

#### Reinforcement

- Choosing appropriate reinforcer
  - Based on type of scent work
  - Rules or regulation of sport
  - Food/Toys equally effective depending on dog
  - Evaluate reinforcers
- From the target/victim – used in SAR to create “victim loyalty”
- From the trainer – more realistic in most real-life situations

#### Challenges

- Laws/Certification
  - Dictates what you can and can’t do
  - Understand what will hold up in court and what won’t – train accordingly
  - Careful of training for the certification test
  - Train for real world – should make you ready for test
- Types of scent
  - Understand science of scent
  - Brownie analogy (Bulanda)
  - Air scenting vs. specific scent tracking
  - Protocols critical since we can’t perceive what dog smells
- Contamination of training materials
  - Container – inadvertently teaching dog to alert on plastic container, baggie, tape, etc.
  - Inadvertently touching objects with hands contaminated with scent
  - Serious scent detection requires careful adherence to careful handling protocols
- Desensitization
  - Already discusses
  - One of the biggest challenges for scent detection trainers
  - Biggest part of training is devoted to real-world scenarios
  - Ongoing process that never ends
- Pressure to succeed
  - Creates anxiety for trainer
  - Increases anxiety on dog
  - Real world scent detection may be serious work, but dog should look at it as fun
  - This will help them to succeed and decrease false alerts or missed finds.
- False alerts
  - Serious issue in many disciplines – wastes resources in searching for something that is not there
  - Missed finds even more serious problem – missing an explosive or not finding a victim has serious consequences
  - Teach an “all clear” signal (the area does not have this scent)
- Understanding “drive”

- Major consideration in many programs and in selection of dogs
- What is drive? A combination of motivation, stamina, and ability
- All dogs can do scent detection
- Not all are motivated to work for long durations
- Picking the right dog for a working environment is critical
- Still revolves around good training
- Ongoing Training
  - Best way to assure a reliable dog is to do regular training sessions throughout detection career
  - Setting up new scenarios and situations (where trainer can ultimately know presence or lack of presence of scent) assists in maintaining confidence for trainer, keeps dog in practice, solidifies reliability in court cases.
  - Too often trainers reduce training time considerably once dog's "training is complete" – Training never ends!

### Common Errors

- Using food as initial target scent
  - Some people teach dogs to find food because it creates "odor obedience"
  - If food is used, it has to be faded out and actual scent used as soon as possible
  - It can facilitate quick learning
  - But it creates the need to use an extinction procedure which can be frustrating for some dogs
  - Some SAR trainers use it to teach tracking, but it teaches the animals to eat food they may find along the way
- Use of corrections when there is an error
  - Almost all scent detection trainers use positive reinforcement after a correct find
  - But many traditional trainers insist on using corrections:
    - To prevent reactions to distractions
    - To punish mistakes
    - To maintain "obedience"
  - This can cause dogs to shut down and prompts many of the mistakes that are common in scent detection.
- Forward chaining
  - Start by working in the field and training scent – shape alert last
  - Forward chaining works, but it takes longer and makes dog less reliable
  - Back chaining is my preferred approach
- Use of modeling
  - Shape the alert by pushing butt down
  - Dogs learn it, but sitting is less pleasurable behavior
  - Alert behavior should be easy and not forced
- Micro-management:
  - Prompting (because trainers knows location of hide)
  - Inadvertently teaching to alert for what we are doing not what they are smelling
  - Talking to the dog ("oh you're getting close") creates a keep going signal that dog becomes dependent on
- Not trusting the dog
  - Once trained and reliable, never doubt your dog (if showing you normal alert behavior)

- Causes accurate but unknown finds to not be reinforced
- If your training situations are set up properly, you should know if your dog is reliable or not
- If not reliable, do not put in field
- Showing find before reinforcement
  - When this is possible, such as in SAR, this is fine
  - But in many scenarios (drugs, explosives) trainers wait to confirm find, which delays reinforcement and decreases dog's accuracy
  - Trust your dog

#### Basic Scent Detection

- Behavior is simple; it is a basic chain
- Opportunity to find scent (Cue to play the "find it" game)
- Scent cues Alert or Report behavior
- Reinforcement delivered or . . .
- Report prompts Recue – "show me" or "refind" (in certain SAR situations)
- Source of scent found (Alert)
- Reinforcement delivered

#### Conclusion

- Many of the challenges regarding scent detection work are very real.
- The unusual, changing, real-world environment of scent detection work requires many skills and many complex training tasks.
- However, the actual behavior of "find scent – alert" is basic.
- Not a complex behavior in itself and that should be the starting point for all scent work.
- If the find and alert behavior is reliable and fun, moving into the real world will be easier.

#### Final Thoughts

- I have great respect for the dedicated men and women who train scent detection for law enforcement, military applications, search and rescue, wildlife conservation, and many other disciplines.
- Their work and dedication is invaluable.
- Today's seminar comes from a place of love – and a desire to help those committed to these noble tasks – to improve their work and make their dog's life better.
- Please contact me with questions or clarification

## Teaching an Animal to Say “No”

Ken Ramirez

Positive reinforcement trainers try to create a safe and nurturing learning environment for animals. When done properly, this makes the learning process fun, and the animal will participate in sessions eagerly. It is common for trainers to point out that their animals have the choice to participate, and that the lack of the use of punishment creates a stress-free working environment. Ken believes these statements to be true when everything is done correctly.

Choice and control have been proven to be powerful reinforcers for most learners. Trainers in recent years have explored how to provide more options in their training. Over the course of Ken’s career as a consultant and problem-solver, he has encountered situations where the relationship and trust between trainer and animal appears to have become strained for various reasons. In a few of the more extreme situations, Ken initiated a protocol in which the animal was taught how to indicate that it did not want to do a particular behavior. In essence, this was teaching the animal to say “no!” In all four cases where this protocol was used, it resolved the problem behavior and moved the animal and trainer back to a good working relationship.

In this Session, Ken will explore these case studies, describe the training process involved, and discuss the broader significance of this protocol. The Session will also compare and contrast the protocol to other types of training that are about teaching the concept of “no.” These other types of training will include intelligent disobedience work with guide dogs and “the all clear” signal in scent-detection work. These latter examples are very different protocols, and the differences will be discussed.

Ken will conclude the Session with a broader discussion of whether his “say no” protocol should be implemented with all learners. It is a unique protocol that is not widely used in the training community. After Ken shares the details of this protocol and his opinions about its use, there will be some time to engage in a discussion with the attendees.

Please note that because this session involves cases that Ken is currently working on, some of these notes may change due to new information that emerges prior to the live presentation.

### Introduction

- Define terms
- History of giving animals choice
- Examples of concepts that appear similar, yet serve different purposes and function differently
- Case studies: Teaching “No” (or, the always viable, reinforceable option)
- Implications and directions for the future
- Latest in my continuing series on conceptual learning

### Definitions

- Terms like “no” and “choice” are simply labels we give to an idea
- Each of us may define the terms differently
- For this presentation, we need a shared understanding of what I mean when I use each term.

### What is “No”?

- Teaching “no” (touching a target), there is no way to know what animal thinks or perceives

- However, we can observe behavior & attempt to interpret significance
- Choosing target instead of the cued behavior may indicate many different things:
  - “No, I don’t want to do that behavior”
  - “This behavior is easier (requires less effort)”
  - “Targeting has better reinforcement history (higher probability of success & reinforcement).”
  - Or insert your own interpretation here
- But all could be interpreted as “no” – or a choice.

#### What is Choice?

- Hard to define
- Arguably, no situation ever provides true choice
- What do I mean by choice today:
  - Animal has option to receive reinforcement in more than one manner
  - Opting out of the cued behavior can still earn reinforcement
- Controlling outcomes (Friedman, 2015)

#### Why Does Choice Matter?

- Real choice is rare
- Often choice is “forced”
- Choice is a primary reinforcer – Friedman
  - If we were born w/o controlling outcomes as a R, what would motivate us to use behavior to access other reinforcers needed for survival (food & water)?
  - It’s an evolutionary advantage to use behavior to control outcomes (this is what behavior is for)
  - Natural selection would favor those who control the environment via their behavior
  - (Joffe, Rawson, & Muliak, 1973; Mineka & Henderson, 1985)

#### History of Giving Choice

- Positive reinforcement trend
- Stationing
- “Manding”
- Improved “reading” of animal behavior (observation/communication)
- Teaching Animal: “I’m Ready”

#### Positive Reinforcement & Choice

- Positive reinforcement relieves pressure and assures a more comfortable and relaxed animal
- Husbandry training became common place, but often these behaviors included some discomfort
- Stationing became a key concept in zoo and aquarium training
  - Assured that animals were ready
  - Trainers do not continue if animal not at station and ready to continue
- However, just because an animal is trained with R+ does not guarantee true choice

#### Learning to Read Animal Behavior

- “Manding” became a buzzword in parts of the community
  - In human learning this is defined as a non-verbal request

- In the zoo it was used to interpret behavior (request) initiated by the animal, not prompted by the trainer
- Example: Dog scratches at the door to indicate need to go outside and relieve oneself
- Example: Animal comes over to trainer and lifts paw to indicate a burr or splinter in foot that needs removal
- Concept was looked at to help trainers recognize when animals may be requesting relief from uncomfortable behavior
- Reading animal behavior AND responding to what they tell us is key

#### Teaching Animal, "I'm Ready"

- Specific behavior that precedes behavior that may cause discomfort (blood taking, nail clipping, etc.)
  - Chin rest
  - Target
  - Stationing
  - Bucket game (Chirag Patel)
- If they are uncomfortable they move out of position or never go into it, and we allow and encourage that
- It empowers them, gives them choice

#### Similar but Different

- There are several concepts that people may confuse with the idea of teaching an animal to say "No" – But each function differently
  - Intelligent Disobedience
  - Go, No-Go Paradigm
  - All Clear
- Making a wrong choice offers no reinforcement options in those situations.
- The "no" can be used after any response and it will be followed by reinforcement.

#### Intelligent Disobedience

- Common guide dog concept – animal refuses to do behaviors that might put handler in harm's way
- Environmental cues trigger variety of pre-determined and pre-trained responses
  - Varied conditions and situations
  - Varied responses
  - Presence of danger cues "refusal to comply"
- Intelligent disobedience is a group of specific behaviors That give the appearance of saying "no"

#### Go, No-Go Paradigm

- Research technique in which animal indicates the presence of pre-selected stimuli by doing a specifically trained behavior. Used to test:
  - Hearing
  - Vision
  - Taste
  - Variety of senses and perceptions
- Lack of perception of stimuli, triggers nothing, animal stays at station
  - Referred to as a no-go



- But is really the lack of response due to lack of perception
- This is a passive choice, animal is not consciously choosing to say no, he just does not perceive stimulus

#### All Clear – Scent Detection

- Lack of target odor cues all clear indicator
  - Original indicator is like a “yes”
  - All clear indicator is a “no”
  - But it is still a clearly cued response
- 

#### The “No” Project

- This project was created as a problem-solving protocol for a unique situation
- Young beluga whale became frustrated with new trainers – she did not seem to find the sessions reinforcing (particularly medical behaviors).
- Staff became stumped and frustrated as to how to resolve problem
- After a few years without resolution, we embarked on this project

#### History for the Whale

- Born in our care and raised in a positive reinforcement environment
- For 5+ years she had no issues and did behaviors eagerly
- As new animals born into the program, experienced trainers worked with her less often and young trainers spent more time with her
- Whale started refusing certain behaviors and would swim off in frustration for certain behaviors
- This was particularly prevalent with younger trainers without strong relationship

#### How Had it Gone so Wrong?

- Positive reinforcement program, there should be no frustration!
- Mistakes occurred and they accumulated over time.
  - Young trainers without strong relationship
  - Misread early, mild signs of frustration from whale
  - Used LRS inappropriately, lengthened it, whale responded as if TO
  - Trainers felt pressure to get behavior, asked for behavior again after refusal
  - Problem was exacerbated over time, discriminated against younger trainers

#### Solution Proposed

- Did she feel as though she had lost the option of choice?
- What if we gave her a way to say “no” – an alternative that was always available to her
- Most important: choosing “no” would always be reinforced
- Suggested teaching animal to touch a buoy if she did not want to do a behavior. Touching the buoy would always be reinforced.

#### Convincing Staff to Try It

- Staff doubted that this plan would work.
- Why would an animal ever perform cued behavior if they have the option to say no?
  - If training is a chore, animal might not want to perform.
  - If training is enjoyable and positive, animal almost always will.

- This always gives animals true choice.
- Shared sea lion project from New England Aquarium

#### Steps to Teaching It

- Place a buoy (target) close by at all sessions
- Point to it intermittently throughout a session and reinforce for touching it.
- Pause between behaviors and prompt her to touch buoy while waiting
- No clear information? Touch buoy.
- Anytime animal makes an error or refuses a cue, point to buoy, mark and reinforce if she touches it
- Within 3 weeks she seemed to understand the concept. Touching the buoy was ALWAYS a reinforceable alternative.
- Animal could choose this option at ANY time.

#### Evolution of Behavior

- After 3 weeks: whale tested the concept, she would touch it all the time, after every cue
- Staff used this as evidence that they were right about animal not ever doing anything if given the opportunity to say no
- But whale continued to work well for those on staff with whom she was closest
- With time, she returned to doing most behaviors
- Only choosing the buoy:
  - When ill
  - When wrong and no marker heard
  - When asked to do a behavior she didn't want to do (almost always medical behavior)
  - When working with a new trainer
  - When working with a trainer with whom she didn't have a good relationship

#### Results of "No" Project

- Took 4 months to firmly establish concept
- Virtually eliminated refusal of any behaviors with experienced staff.
- She still tests new trainers (for one or two weeks)
- If she knows she makes an error and does not hear the marker, she comes back and touches the buoy (which is reinforced).
- This has been a very successful project!

#### Uses of this Concept

- Used the concept 4 times with similar results
- 1 beluga, 1 sea lion, 2 dogs
- All were cases where the animal had lost trust in training game
- Used to build confidence in animal and make training fun again
- In all cases, use of "no" diminished to below 2% once well established

#### Does it really mean "no" to the animal?

- Impossible to be certain
- It is a default behavior that animal has learned will be reinforced in all situations
- Once learned only used for
  - "difficult" behaviors

- “uncomfortable” behaviors
- With trainers animal did not know or trust
- After an error
- Hard to make any other interpretation
  - “I’d rather do this”
  - “this is easier”
  - “this earns me reinforcement too”
  - All of these essentially mean the same thing: NO

Should use this with all Animals?

- Given this question lots of thought
- Ultimately have determined not best practice
- When animal trained with positive reinforcement and trainer knows how to read body language, the animal is able to say “no” in many ways and the wise trainer accepts this and adjusts training to assist animal – a separate way of saying no is not needed.
- It is most useful for clients who have a hard time reading animal behavior
  - Children
  - Large families
  - Blind clients
  - But would only use if needed (rarely is)

Implications - Next Steps

- Great protocol for resolving certain problems
- Behavioral principles at work? Haven’t yet analyzed:
  - Contrafreeloading
  - Matching law
  - Differential outcome effect?
  - Other possibilities?
- Well used positive reinforcement – in which animal signals are understood and responded to – sets animals up to have choice and succeed
- Another type of conceptual learning that may have other uses as it is explored further.

# Concept Training

## Introduction

- Karen Pryor's Clicker Expo seminar
- Concept training – taking a step beyond the standard operant paradigm
- Can an animal think beyond specific cues and generalize?
- Concept training is used with many animals, it is not asking too much of your dog!

## Concept Training Examples

- Space conceptualization - Guide dogs
- Modifiers: Right or Left; Up or down – Search and Rescue training
- Matching to sample – Service dogs
- Addition – Combining establish cues to create new instructions
- Mimicry as a behavior – new research being conducted by the Navy

## A Step Beyond The Normal

- Standard clicker training approach teaches very specific behavior
- Creative games make concept training easier
  - Free shaping
  - 101 things to do with a box
- Clear criteria is still important
- Taking your animal to the next level

## How Do I Begin?

- Important preliminary training before you even consider concept training
- Establish solid basics
  - Clicker
  - Clear criteria
  - Understanding of cues
- Desensitize to new things constantly
- Practice generalization
- Allow creativity within a framework – the animal must learn that you want him to think beyond the cue
- Until you have a well-trained dog, you cannot seriously consider concept training

## MODIFIERS

### Modifier Cues

- Useful in many scenarios
  - Right vs. Left
  - Top vs. Bottom

- Round vs. Square
- Large vs. Small
- Numbers
- Colors (careful!)
- Determine what you will ultimately use or need, plan before you start
- Getting started – right and left (or over and under) are clear concepts that can be taught faster than others
  - Internal modifiers: constant, objective
  - External modifiers: variable, subjective
  - Abstract modifiers: challenging
- Once your animal knows at least three pairs well, new modifiers usually come more easily
- Teach animal more than two modifiers (Large, medium, small)
  - Difficult
  - Seldom needed
  - Not impossible
- Making sure your animal really “understands” – will your animal pass a real world test?
- Step by step – How to teach modifiers

#### Modifiers – Important Points Before You Begin

- Start with solid action behaviors:
  - Target
  - paw/shake
  - retrieve
  - spin
- Don't dwell on one step for too long or generalization becomes difficult
- Train in pairs, it speeds up the process
- Teach in a pressure-free setting, if it's fun the animal learns faster
- Determine syntax rules
  - NOUN, MODIFIER, VERB
  - BALL, LARGE, RETRIEVE
  - SHOE, SMALL, RIGHT, RETRIEVE
- If action cue isn't last, consider teaching a release signal

#### Internal Modifiers – Step by Step

1. Teach right & left with known behavior:
  - Whales/dolphins: target
  - Dogs: paw/shake
2. Fade prompts
3. Increase distance
4. Change targets
5. Change behavior
6. Add obstacles
7. Increase complexity

## External Modifiers – Step by Step

1. Determine objects to be used (large/small)
2. Start with one of the extremes, either the smallest or largest size available.
3. With subjective, variable modifiers it is usually helpful to make sure one extreme is well understood before teaching the opposite modifier.
4. Pick a pair to begin with
5. Vary location of objects
6. Switch the non-target often
7. Once animal reliably understands the large object, change it
8. Add variability as quickly as animal shows you he's ready
9. Use errorless learning if needed
10. Once first extreme is reasonably well learned, move to other extreme
11. Switch regularly between the two – while also changing focus and non-focus objects and position.
12. When your animal is recognizing those two modifiers reliably with one type of object, transfer to a second type of object.
13. Don't use objects that make discrimination more subjective than needed.

## ADDITION

### Types of Addition

- A type of compound cue – can come in many forms.
- Today we will focus on just three
- Additive addition – Cue one behavior, while animal performs that behavior cue next behavior so that animal continues with first behavior and now adds the second behavior, performing both simultaneously.
- Conceptual addition – Animal learns the idea or concept of doing two or more behaviors together and understands the concept so thoroughly that the trainer may cue two (or more) behaviors that have never been put together previously but the animal understands and executes the behaviors asked.
  - “AND” – This version requires the animal to perform all behaviors cued simultaneously.
  - “THEN” – This variation requires the animal to perform all behaviors cued in order, one after the other, in the sequence presented when cued.

### Additive Addition

- Most trainers have done this in some simple or passive form.
  - Passive: To kennel or mat now lay down (while remaining in kennel or on mat)
  - Active Basic: Run with me now jump over hurdle or go through tunnel (while still running with me)
  - Active Complex: Laydown now come to me (while still laying down) – creating a crawl
- More complex combinations require more work on the part of the animal
- Animal often stops doing first behavior to offer second behavior
- Prompting often required to get animal to do both together
- Also requires certain amount of coordination from animal, which can be developed with practice

- The more often additive adduction is used, the more capable (and more quick) the animal becomes at grasping new combinations
- A good first step toward the “AND” version of conceptual adduction

### Conceptual Adduction

- It becomes conceptual based on several criteria
  - Animal can receive multiple cues before carrying out instructions
  - Animal can combine behaviors that have never been previously combined or trained together
  - Without both it has not reached the level of a true “concept”
- Not better than additive adduction, but perhaps useful for certain unique situations
- Often requires a mechanism to let animal know when trainer has completed series of cues
  - Release signal
    - “Go”, “OK”
    - Target removal
    - Location specific to adduction
  - Multiple modal cueing
    - Verbal cue combined with Visual clue – presented simultaneously or back to back
    - Can reduce or eliminate the need for a release signal
- Start by having series of well-established behaviors that keep animal close to you so that you can coach them through the process. Examples:

Bark	Bow	Beg
Roll over	Spin	Back up
Paw lift	Come	Mat

### “AND” with Multiple Modal Cueing

1. Begin by practicing/teaching additive adduction
2. Use a combination that has been successful with additive adduction
3. Make sure two behaviors you plan to combine are reliable when cued individually
4. Try cueing them simultaneously
5. Prompt animal by re-cueing if animal offers only one of the behaviors (similar to what was done during additive phase)
6. Regress to individual behaviors if the animal is not having great success
7. When reliably combining behaviors that were trained the additive way, ask for novel combinations (coach them through it if needed)

### “AND” with Release Cue

1. Begin by practicing/teaching additive adduction
  - a. Animal proficient at more than 5 or more combinations
  - b. Make sure animal still responds to individual cues correctly and does not assume combinations are the new behavior
  - c. Animal will quickly learn new combinations
2. Separately, teach a release cue or mechanism
  - a. Practice with easy behaviors
  - b. Increase time between cue and release until able to wait a full 5 seconds or more
  - c. Gradually use for more active behaviors, increasing time as described above

3. Once steps 1 and 2 solidly learned:
  - a. Ask for a simple combination using release – start with reliable combination that was already trained using additive adduction – prompt animal to add other behavior if they offer only one
  - b. Once this is accomplished try with new, but previously used combination.
  - c. Continue with previous combinations until animal is offering correct response on first try.
  - d. Attempt novel combination
4. If you want to get really creative:
  - a. Try combinations of three behaviors
  - b. Increase time between cues and release
  - c. Try combinations that seem illogical – be prepared to reinforce for honest effort
  - d. These last steps are really pushing it but may be fun for the advanced animal and trainer.

#### Training “THEN”

- Similar approach and challenges to training “AND”
- Normally I would never train “AND” and “THEN” within the same time frame.
  - Start with version you feel will be most useful to you
  - May be only type of adduction you use
  - If you want or need to train both, wait until one version is well learned
  - Find a key to differentiate them to the animal
    - Multiple modal cueing for one and release signal for the other
    - Different release signals for each
    - Contextual difference (location or other differentiator)
- Helpful preliminary work
  - Train small chains regularly
  - Teach animal to work in clusters, multiple behaviors before reinforcement
  - Either builds expectation and understanding that behavior after behavior might be required

#### “THEN” through Additive Adduction

1. Begin with established behaviors
2. Use one behavior that provides destination information (such as “go to mat” or “into kennel” or “go to target”) and another behavior that animal should perform when it gets there (“sit”, “lay down”, “spin”, etc.) – the destination behavior will help clarify concept in their mind.
3. Cue destination behavior; while animal is on its way; cue the next behavior. If they don’t get it, when they arrive at destination cue the second behavior again.
4. Consider adjusting the timing of your second cue. Present second cue, just before arriving at destination.
5. Gradually give the second cue further from the end and closer to the beginning until you can give both cues one after the other.
6. Maintain individual behaviors on single cue.
7. Try as many different behaviors at destination as possible to assure that a chain has not been developed.
8. Follow the whole process with different initial destination behavior.



9. Try two behaviors, if the animal does not understand, regress and continue using more combinations in the previous steps.

#### Use of Behavior Chains

- Back chain several small combinations
- Continue back chaining new combos until animal learns them quickly
- They now have understanding of behavior followed by another behavior
- This is useful whether you plan to train “THEN” type adduction or not.

#### “THEN” with Release Cue

1. Begin by training behavior chains as described previously
2. Separately, teach a release cue or mechanism as described earlier
3. Begin to use the release cue for previously established two-behavior chains
4. Ask for chain several times with chain cue, then try asking for the two behaviors in order using individual behavior cues, then release, animal should offer chain
5. Repeat this with other previous established chains
6. Once animal understands the use of individual cues to trigger sequence, start trying novel combinations – you may have to prompt animal with second cue after completion (or just before completion) of first behavior.

#### Applications

- Most behaviors that we train are already a combination of smaller behaviors
- Additive adduction is commonly used, most trainers use it already
- Conceptual adduction – the ability to combine two novel behaviors the first time asked – is probably not as useful or needed
- However, if learned it will speed up the learning of new behaviors
- The creative trainer and creative animal will find many uses for adduction

#### Closing Thoughts

- Adduction is a useful tool, whether learned as a true concept or not
- Conceptual training stretches skills of trainer and animal
- Don't stretch your animal beyond its comfort level
- Train in small approximations and build to your desired goal
- I have shared various training plans – as always these plans represent ONE way not THE way
- We could only scratch the surface in a short seminar, please feel free to contact me if you have questions.

## **MIMICRY**

#### Mimicry as a Behavior

- Animal taught to copy what another animal does – even if a completely novel behavior
- Can speed up complex training
- First used by Navy dolphins – 5 year training project reduced to 2 years
- Challenges if behavior breaks down

#### Blindly Marching into Controversy

- Always fascinated by concept training
- Taught dolphins to replicate project
- Replicated with injured search and rescue dog for stimulation during recovery
- Trained it several more times with additional dogs
- Later confronted by behaviorists claiming “dogs not capable of mimicry.”
- Never thought to video tape my sessions – didn’t know it wasn’t possible

### Semantics & Theory

- Mimicry not natural behavior in dogs?
- If true, it may not be natural but it can be taught
- Most mimicry-like behavior in dogs is often referred to as “social facilitation” and not true mimicry
- My goal today is not to create scientific proof – but to show you how to train it

### Mimicry Training Procedure

- Begin with two dogs that have shared behavioral repertoire of at least 5 or 6 behaviors. Select compatible dogs!
- Begin training with dogs in close proximity where they can easily see each other during training - positioning is critical aspect to success.
- Ask animal #1 for a behavior, followed by the mimic cue, followed immediately by the cue for the same behavior for dog #2 (already trained behaviors for both dogs).
- Repeat this with other known behaviors over & over again – until dog #2 begins to anticipate the behavior.
- Vary behavior frequently and repeatedly so that the mimic cue never comes to be identified with any one behavior.
- Once dog #2 is anticipating the cue and offering the behavior on the mimic cue, start attempting to ask for new behaviors not yet tried with the mimic cue (but already in both dogs repertoire).
- Once you have confidence that dog #2 understands the mimic cue:
  - Mask/hide trainer/dog #1
  - Switch target dog(s): reliability
  - Use novel dog as target
- Try novel behavior only after concept clear (start simple)
- Goal: focus dog makes an “honest” attempt to offer this “new” behavior!

### Recap for Clarification

- Get in the “groove” with 3 shared behaviors, example:
  - Sit
  - Down
  - Spin
- Add a 4<sup>th</sup> behavior – that both dogs know:
  - Bark; Back-up; Rollover; Anything will work
- Then add 5<sup>th</sup> behavior, include masking
- **Train** concept before **testing** it – this is a critical distinction – wait for novel behavior
- Try novel behavior
- Try new novel behavior

### Mimicry Challenges

- Finding dogs with shared repertoire

- Making sure animal is not picking up other cues
  - Watching other trainer's cue
  - You knowing the desired behavior and telegraphing it
- Interpreting an "honest" attempt
  - Be liberal at first
  - More strict as concept is grasped

#### Testing Your Animal

- How to know if your animal truly understands a "concept"
- Making sure you don't bias your "transfer test"
  - New items/scenarios
  - Other trainers/handlers
- Making the use of "concepts" fun for your animals

#### Keys to Concept Training

- Solid basics
- Teaching creativity
- Know ultimate use – have a plan
- Set training goals that prevent bias
- Testing for concept understanding

#### Keep it Fun!

- Concept training is not asking too much of your animal!
- The more concepts that you train the more useful they will become.
- Planning, planning, planning!

### **COUNTING (A Review of Process)**

#### Overview

- Reminder (or intro) of past steps to "Counting" Project (Numerosity or Quantity Recognition)
- Discuss most recent 3<sup>rd</sup> phase of project
- Explain training involved (from start to finish)
- Describe some of adjustments and controls
- Share data
- Discuss possible significance of results (including comparison to similar human studies)

#### Background

- I have worked with the idea of counting with many species
  - Research settings with primates and cetaceans
  - Dogs as a cool "parlor trick"
- There are various ways to approach the concept – my journey has been interesting & challenging
- A look at some early trials with California Sea Lions (Kathy Streeter, New England Aquarium). . .

#### Practical Uses

- Has been used in SAR settings to have dog report number of victims found

- Tested with military to have dogs report back number of intruders detected
- Ultimately not that helpful or useful even in those scenarios
- Few other practical purposes.
- Stretches your skills and your dog's skills

#### Phase 1

- Original project designed to demonstrate how to train basic "counting" behavior. (part of series on concept training)
- # of objects taught as cue to for a specific behavior
- I begin most projects of this complexity with exploratory training:
  - Opportunity to work out logistics
  - Chance to see how animal responds to set up
  - Better information to improve the plan
  - "Training without a plan"

#### Indication Behaviors

- In essence – my approach is to teach a different indicator behavior for each #
- I start with a behavior for each #, example:
  - 1 = Sit
  - 2 = Down
  - 3 = Kennel
- The number of objects presented becomes a cue for each of those behaviors
- Dog – Dory: 3 year old rescued shepherd mix

#### Other Approaches

- Indicator behaviors can come in many forms
  - Rope pull
  - # of barks
  - These look good, but are easily biased (too susceptible to Clever Hans syndrome)
- Tried varied targets as indicator with a new dog: Coral – 3 yr. old rescued Airedale mix
- Different target for each number
- This approach looks impressive, but is absolutely no different than the behavior indicator just demonstrated

#### Final Thoughts on Phase 1

- Completed this in January 2014
- Assumed this would be it, mainly trained it to teach others how to train it.
- Excellent use of advanced skills
- But during ClickerExpo 2014 several people made suggestions, inspiring me to go further
- It could be an important research project

#### Phase 2

- Turn it into research
- Change indicator: used equivalency matching
- Expanded numbers gradually over time
- Randomized order of #'s and position of dots

#### Phase 2 Final Thoughts

- Advanced to as many as 8 objects & continued to have a nearly 90% correct response rate
- Added controls for scientific purposes, conducting double blind trials & using a computer to determine randomization
- I completed this project in October of 2014 and reported on it at ClickerExpo 2015
- I felt I had gone as far as I had time and interest in going with this project

#### Showed the Project to Colleagues

- Received great scientific feedback
- Although all applauded the project, they raised interesting and significant questions:
  - How are we defining “counting”?
  - How do we know that Coral is not subitizing? (Defined as “instantly seeing how many”)
  - Is it possible that she is simply using pattern recognition?
  - Have I looked at literature for counting studies with children and other animals?
- They made suggestions on what would make the study more compelling.

#### Decided to do some Research

- I looked at many counting studies:
  - Dogs – nothing beyond 5 (only two studies)
  - Birds – several interesting studies (Crows & Alex)
  - Rats – Lots of work done in lab setting
  - Children – Tons of research (birth to 5 years old)
- Contemplated possibilities considering:
  - My time
  - Coral’s availability
  - Coral’s interest
  - My reduced resource pool (space and staff)

#### Phase 3

- I finally decided to begin a new phase using the new information and suggestions.
  - Use more than one “new number” so that Coral is not simply selecting the one that is different
  - Change the shape and size of the “dots” on the board to interrupt pattern recognition:
  - Use previously trained matching to sample skill to increase number of possible questions per tray and further reduce possibility of subitizing.
- A tray with multiple different types of objects would lend itself to numerous correct responses, depending on the question.
  - How many Kongs? How many balls? How many total items?
  - Possibilities are broader and less prone to bias.

#### Training & Trial Challenges

- New location – Coral had never been in space and it had many foreign dog smells
- Gap in training – Project was restarted after a 9-month break in project
- Coral changes – living in new environment and not exposed to Ken during that break
- Trial set-up – totally different configuration (other than tray and boards)
- Lack of staff for so many positions, had to reduce # and still maintain blind trial conditions

#### Reintroduction to Project

- Excited to see me, great reunion

- First day:
  - 3 sessions to be back where we left off
  - 2 sessions to remind her of matching to sample
  - 7 sessions to introduce her to concept of both

#### Preliminary Data

- Phase 1: 3 Objects 98%
- Phase 2: 5 Objects 95%
- Phase 2: 8 Objects 90%
- Phase 3: New #'s, no training, multiple options
 

	<u>1<sup>st</sup> TRIALS</u>	<u>REPETITIONS</u>
9-10 Objects	84.2%	87%
11-14 Objects	79%	80.4%
15-17 Objects	61%	62%
18-22 Objects	52%	44%

#### Interpreting the Data

- We believe we have eliminated pattern bias
- Counting? Depends on how you define it.
- Quantity recognition/understanding: clearly to #14
- Significant decline at higher #'s (but above chance)
- Frustration set in at higher #'s – overall decline until we returned to easy – then stable up to 14
- No correct answer conditions – some logic could be inferred
- Significant findings when compared to other studies

#### Existing Counting Research

- Definitions of “counting” not clear nor consistent
- Numerical understanding has been seen in most animals to some degree
- Children’s studies show huge change between ages of 3 and 5. Numeric competencies fall into 3 areas:
  - Conceptual
  - Procedural
  - Utilizational
  - Most agree that many animals possess the last two competencies as needed to survive in their world
- Great evidence to suggest that animals while not having natural ability to count, can demonstrate good skills if they are receptive to training and associative learning
- Studies indicate that many children with ADD score above average for children their age on counting studies
  - Hyper awareness seems to make handling concepts such as counting easier
  - Is there a correlation between this and a highly reactive dog (very aware of the environment)?
- Other than counting projects with children, few animal projects have gone very far nor replicated their work.
- Still an area where there is debate and controversy

#### Final Thoughts

- I think I can definitely say that Coral can recognize quantities up to 14 (it may not meet the definition of counting, but it's remarkable)!
- Is it a skill that female dogs need to keep track of their puppies?
- Her highly reactive nature (super awareness of her environment) may have been an advantage.
- She did better than most children 3 and under on this type of study (significant shift as children reach ages 4 and 5)!
- Clearly this work needs to be replicated (I would be happy to help or partner with someone).
- Publication planned in the future.

#### Are You as Smart as Your Dog?

- Measures of intelligence are far from perfect and the question is not actually a fair question.
- Animals are as smart as they need to be to survive in their world.
- But was Coral doing something that was beyond our ability?
  - Beyond the ability of young children
  - Faster than most people can do it
  - Why? And what does that imply?
- Food for thought . . .

