



Raptors in Captivity

...

CAU Lecture 3
Meghan Jensen, Ph.D.



Behavior

Why is understanding behavior important?

- 1) It helps us optimize health and welfare (including mental well-being)
- 2) It improves husbandry and management practices
- 3) It ensures ethical, evidence-based care



Stress Behaviors

- Posturing
 - Beak open (gaping)
 - Wings out
 - Erect feathers on head or back
- Panting
- Alarm calling
- Moving away
- Crouching/Scanning

Some *Buteo* hawks have erect nape feathers when in defensive posture →



Stress Behaviors - Owls

- Gular fluttering
- Slimming
- Beak clacking
- BNOW: Toe Dusting



Stress Behaviors - Vultures

- Hissing
- Vomiting



Other stress indicators in captivity

- Bating without recovering
 - Bating off the glove can be triggered by stress but can also be triggered by instinct
 - Being startled, a strong gust of wind, etc.
 - While we try to reduce bating, it's sometimes impossible to prevent so the key is recovery
- Pancaking when tethered



Stress: Friend of Foe?

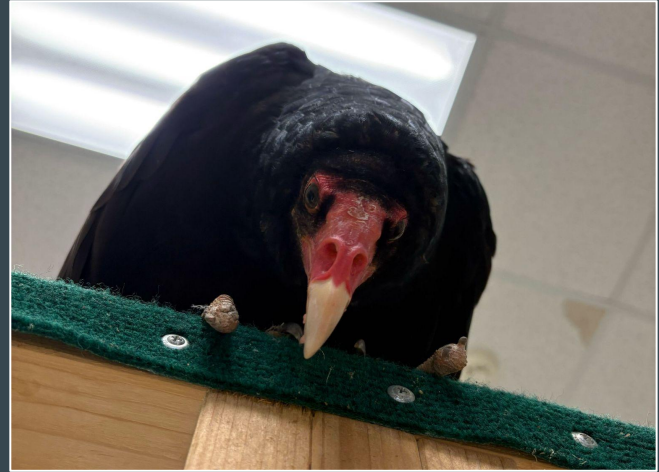
- Normal physiological response
- Essential survival mechanism
- Not inherently harmful

However...

- Chronic or prolonged stress can impair health and welfare

Key Takeaway

- Goal = manage and minimize excessive stress
- Stress cannot (and should not) be eliminated completely
- Some stress is normal and beneficial



Desensitization

- Stress responses are often most pronounced when experiencing something new/unfamiliar and will lessen with repeated exposure (desensitization).



The Important Question

When a bird does get stressed, how long does it take to recover?



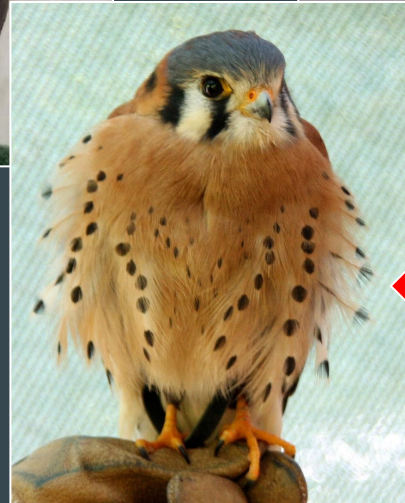
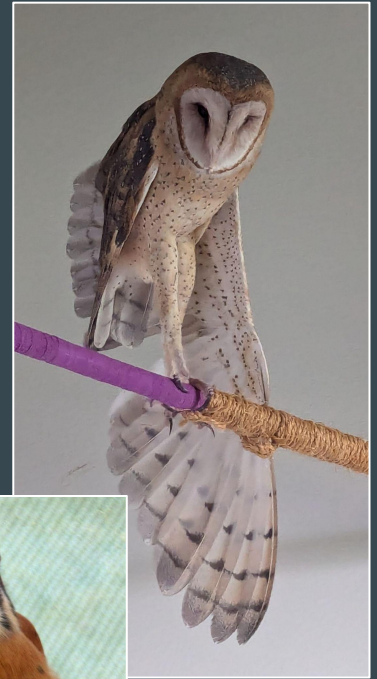
← Gracie had to be restrained to pull a broken blood feather

A few minutes after restraint, she was drinking and bathing →



Comfort behaviors

- Foot tucking
- Fluffed feathers
- Loafing
- Wing stretching
- Rousing





Comfort Behaviors - Self-care

- Preening
- Bathing



Comfort Behaviors

For some species:

- Relaxed facial feathers
- “Almond eyes”

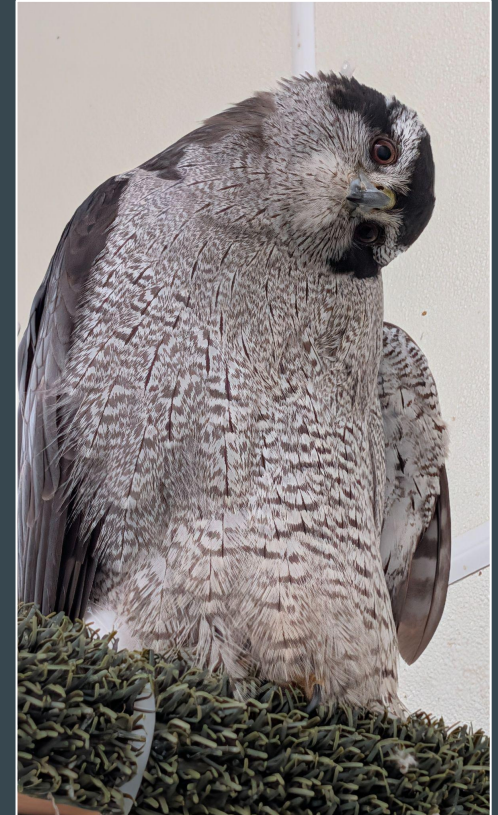
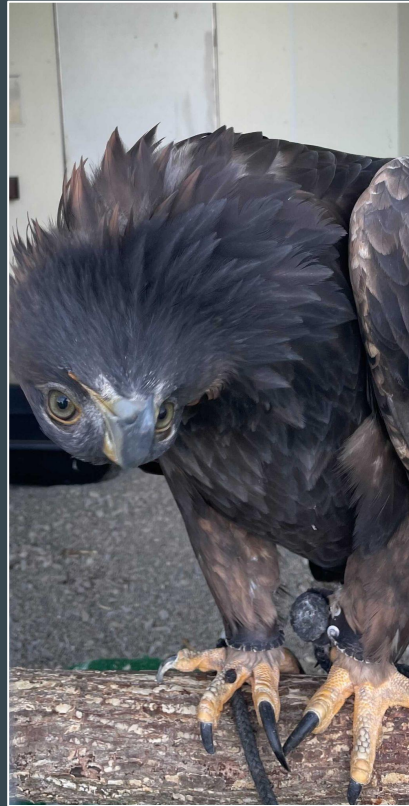


← Normal
eye shape

Almond eye
shape →



Other comfort behaviors unique to captivity?

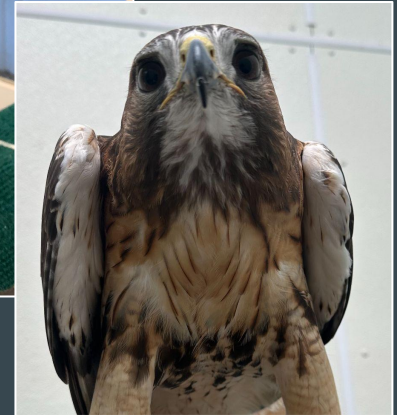


Comfort → Stressed

Video by Joe Whitehead at
Shaver's Creek Environmental
Center



Is this bird stressed or
comfortable?



Is this bird stressed or
comfortable?



Alternative Meanings

- Panting
 - Also caused by warm temps
- Alarm calls
 - Can be a territory announcement or excitement
- Rousing
 - Could legitimately need to reposition feathers
- Fluffed out body feathers
 - Can be a sign of illness, especially if paired with mostly or fully closed eyes
- Flapping wings in falcons (esp. Peregrines)
 - Could be stress OR excitement



Body language is Nuanced

- Differences between species:
 - Relaxed head feathers on AGOS vs. hackles on head of RSHA
 - Relaxed chin feathers of falcons/hawks vs. gular fluttering of owls
 - Almond eyes in hawks vs. slimming in owls
- Every bird is a study of!



Always look at behavior
as a WHOLE



Welfare

Animal Welfare

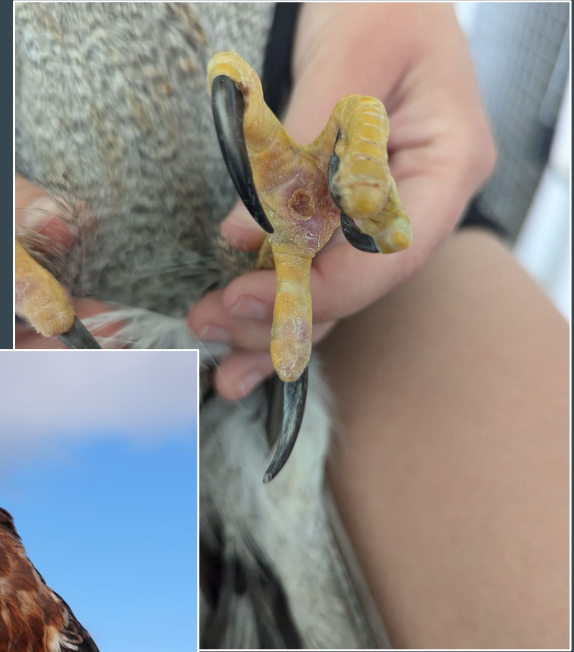
“An animal's collective physical, mental, and emotional states over a period of time, and is measured on a continuum from good to poor.”

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Captive Raptor Health Concerns

Physical health concerns:

- Less movement/exercise
 - Obesity
 - Muscle atrophy
- Disease
 - Hepatic lipidosis
 - Bumblefoot
 - Infections (e.g., aspergillosis)
- Pain
 - Hidden well
 - Often small behavior changes
 - Worsening injuries



Captive Raptor Health Concerns

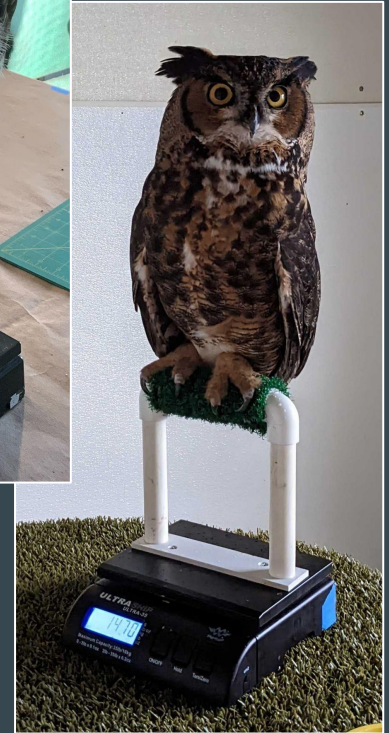
Physical health concerns:

- Extended lifespan
 - Raptors live 2-3x longer in captivity
 - Age-related health issues
 - Atherosclerosis, cancer, organ failure



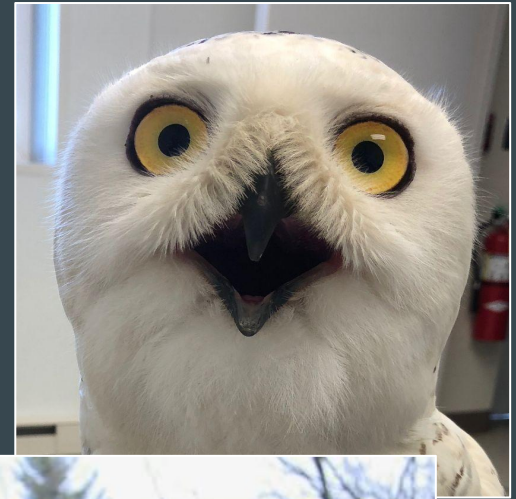
How do we ensure optimal physical health?

- Diet tailored to species, Vitahawk
- Daily interactions to monitor behavior
- Careful weight management
- Intentional training
 - Health is always 1st (cooperative care) & exercise
- Annual wellness exams
- Medication if prescribed
- Aviary upkeep - maintain varied and appropriate perching options



Captive Raptor Mental Health Concerns

- Signs of poor well-being
 - Disinterest in food/chronically underweight
 - Disinterest in enrichment
 - Chronic fear/anxiety of humans/routine husbandry
 - Stereotypic behaviors
 - Lack of comfort behaviors
 - Lack of self-care



Captive Raptor Mental Health Concerns

- Less than ideal environment
 - Not having a “safe space”
 - Aviary design not suitable for mobility



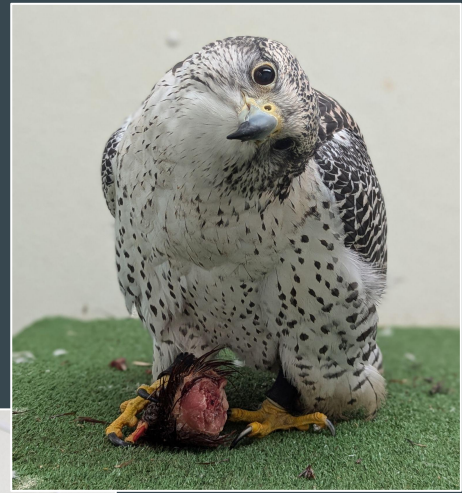
Raptor-specific welfare concerns

- Too frequent restraint
 - Vaccines, wellness exams, etc.
 - Consistent and nutritious diet → beak and talon overgrowth
 - Repeat stress → Capture myopathy



How do we ensure optimal mental health?

- Choice-based, positive reinforcement focused training
- Intentional training with clear priorities:
 - *Health (cooperative care)*
 - Husbandry (desensitization)
 - “Job”
- Strategies to minimize restraint and minimize stress during restraint
- Enrichment



Enrichment

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“A process to ensure that the behavioral and physical needs of an animal are being met by providing opportunities for species-appropriate behaviors and choices.”

Encourages:
Natural behaviors
Movement
Problem solving
Exploration
Agency & Choice!



Prevents:
Boredom
Problem behaviors

Decreases:
Neophobia

Nutrition & Exercise

Goal Behaviors = Forage, find, move

- New food item
- Whole prey item
- Scatter or hide food
- Puzzle toys
- Live prey items/lures
- Controlled flights

Grooming & Self-maintenance

Goal behaviors = Grooming, bathing, beak & talon maintenance, thermoregulation

- Dust bath/Water bath
- Mister bottles/sprinklers
- Skulls/wings/spines/carcasses
- New/varied perches/substrates
- Access to weather (sun, snow, etc.)
- Access to heat source or ice

Sensory

Goal behaviors = Hear, Smell, Watch, Touch, Shred

- Walks/perch/flight outside aviary
- Put items in water
- Substrates (bark, grass, rope, stumps, gravel, sand)
- Paper items; cardboard boxes
- Mirrors
- Sounds or scents
- Whole gourds, veggies, pinecones, sticks, plants
- Misc materials - bubbles, wool, fur, snake skins

Environmental & Social

Goal Behaviors = Vocalizing, nesting, natural displays

- Walks/perch/flight outside aviary
- Aviary changes / move to new aviary
- Visual or auditory access to conspecifics
- Predator-prey enrichment
- Nest boxes
- Nest building materials*







How do we know how we are doing in terms of Welfare?

- Standardized assessments to quantify and track subjective metrics over time
- Performed annually
 - Can be performed more frequently for specific birds (e.g., geriatric, new residents, etc.)
- Developed for our specific program using guidance from:
 - Published literature
 - AZA, IAATE, EAZA
 - Format and procedure modelled after other raptor centers

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Training

Operant Conditioning

Operant conditioning = behavior shaped and maintained by consequences

- **Positive:** Something is added
- **Negative:** Something is removed
- **Reinforcement:** Anything that increases the likelihood a behavior will occur again
- **Punishment:** Anything that decreases the likelihood a behavior will occur again

4 Quadrants of Operant Conditioning

	ADD OR GIVE SOMETHING	SUBTRACT OR TAKE AWAY SOMETHING
THE BEHAVIOR HAPPENS MORE OFTEN	+ R POSITIVE REINFORCEMENT	- R NEGATIVE REINFORCEMENT
THE BEHAVIOR HAPPENS LESS OFTEN	+ P POSITIVE PUNISHMENT	- P NEGATIVE PUNISHMENT



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In captivity

Humans arrange consequences in captivity

Focus primarily on positive reinforcement

- Mimics natural rewards (e.g., food)
- Strengthens desired behaviors without stress and lowers risk
- Demonstrated to be the most effective method for establishing long-term behavior change



Noel Acor

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4 Quadrants of Operant Conditioning

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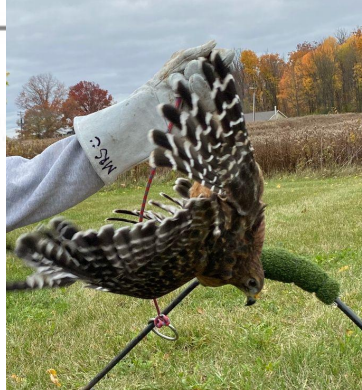
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+ R
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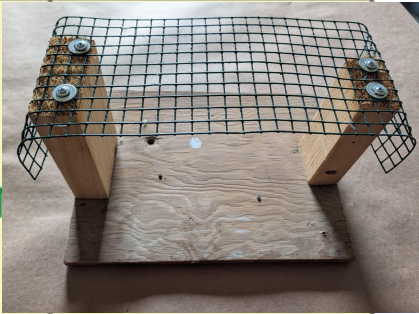
- R
**NEGATIVE
REINFORCEMENT**

THE BEHAVIOR
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Important Notes on Punishment

- Punishment is an effective tool for halting unwanted behavior
- The effect is usually temporary
- The unwanted behavior is likely to return in the absence of the punisher
- It does not teach what to do instead
- Punishment techniques are often reinforcing for the trainer

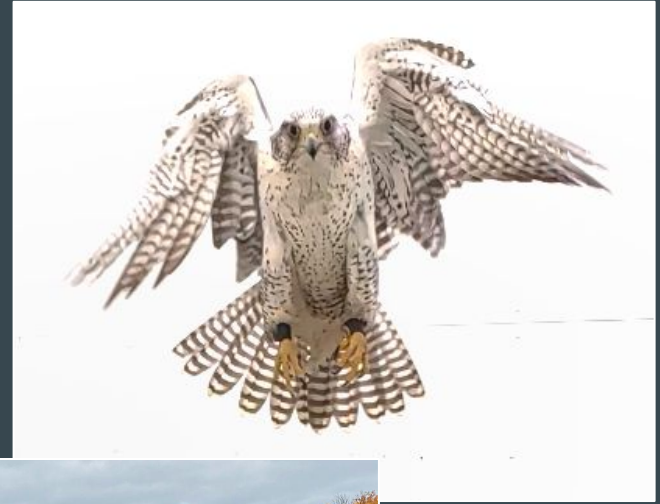
(Paraphrased from Karen Pryor's *Don't Shoot the Dog*)



Focus on Positive Reinforcement

The other quadrants of operant conditioning aren't inherently bad, but they are *less effective* at producing lasting behavior change.

Especially if animal welfare or handler safety is a concern, other methods may be necessary!



ABCs of Training

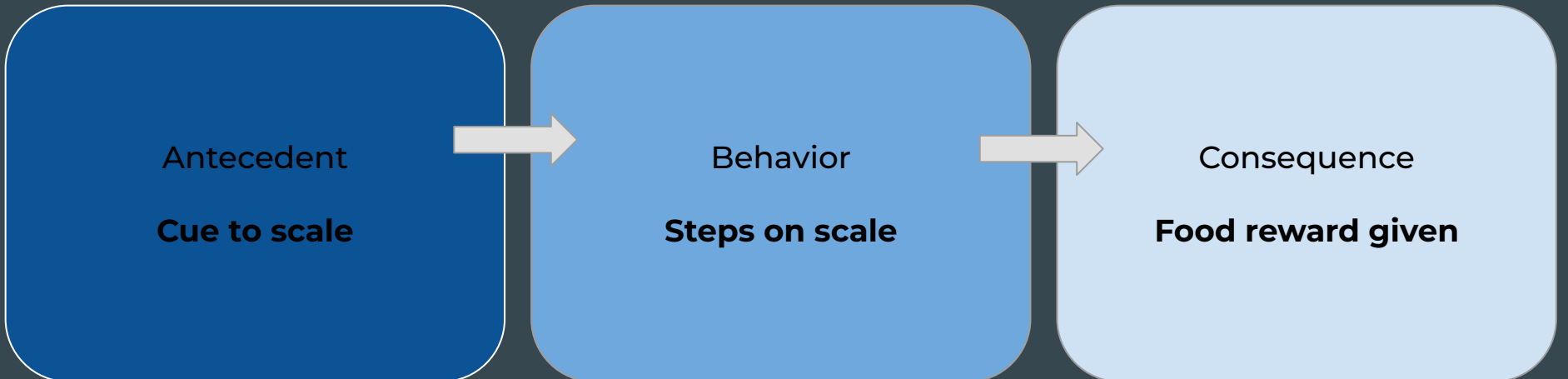
Antecedent



Behavior



Consequence



```
graph LR; A[Antecedent  
Cue to scale] --> B[Behavior  
Steps on scale]; B --> C[Consequence  
Food reward given];
```

Antecedent

Cue to scale

Behavior

Steps on scale

Consequence

Food reward given

Antecedent
Cue to scale



Behavior
Steps on scale



Consequence
Food reward given



Rewards

- Rewards are dependent on what motivates an animal/individual
- Primary Reinforcers - naturally rewarding
 - **Food*****
 - Type, size, and rate
 - Enrichment
 - Water (misting/bath)
 - For vultures: social interaction
- Timing is essential!



Bridges

- Secondary Reinforcers - learned reward
 - Bridges
 - Verbal “good” or “yes”
 - Clicker, whistle, etc.
 - Used to “mark” the desired behavior

Antecedent
Cue to scale

Behavior
Steps on scale



Consequence
Food reward given

Antecedent
Cue to scale



Behavior
Steps on scale



Bridge



Consequence
Food reward given

Teaching the Cue - Luring/Baiting

- Raptors don't inherently understand human words or gestures, like pointing.
- So, we have to find ways to prompt them then eventually learn a "cue".



Teaching the Cue - Luring/Baiting

- Raptors don't inherently understand human words or gestures, like pointing.
- So, we have to find ways to prompt them then eventually learn a "cue".
- Fade out prompts (like lures) quickly so the animal responds to the cue, not the reward



Teaching the Cue - Capturing

- Behaviors that occur naturally can be “captured” by marking and rewarding them, then paired with a cue.



Shaping Behavior

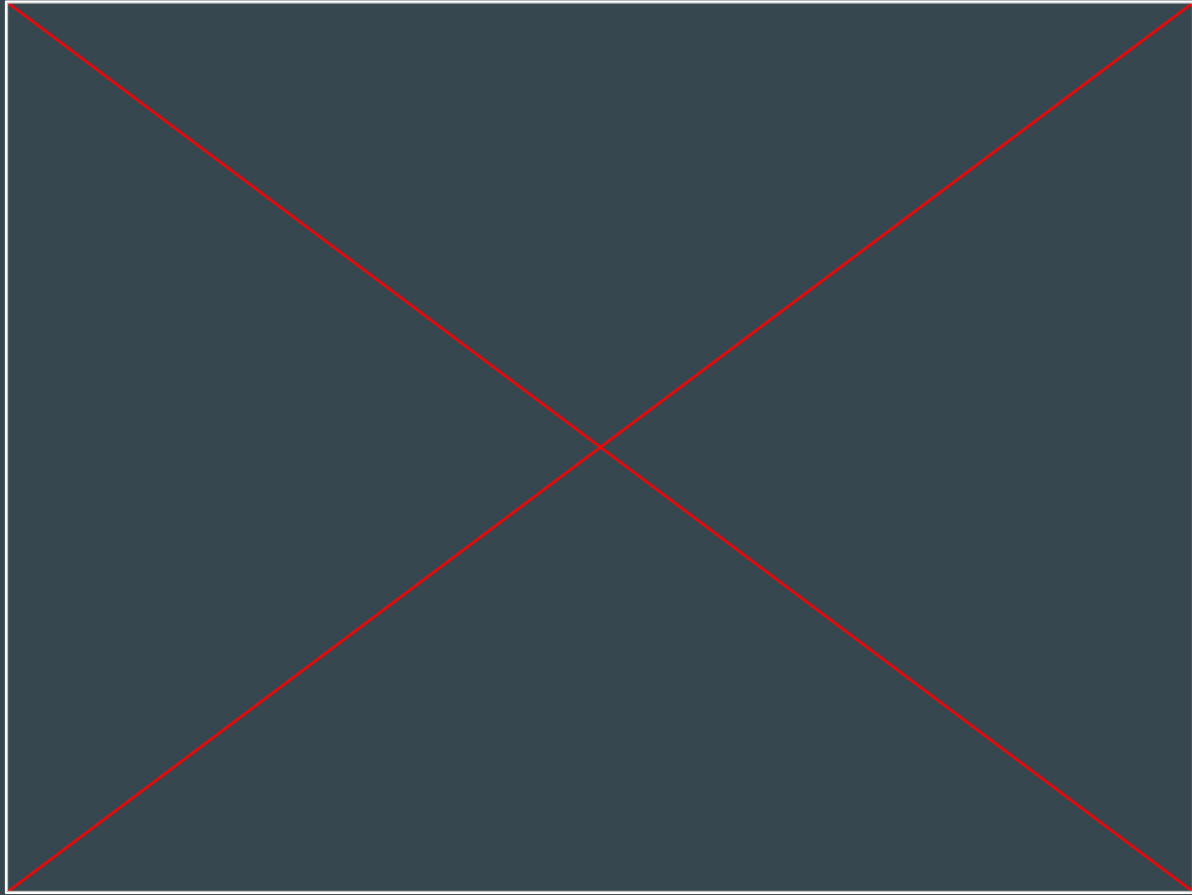
- Break training tasks down into small steps
- Move to the next step once the animal is completing the existing step without hesitation



Shaping Behavior



Complex behavior sequences





Antecedent

Cue to scale



Behavior

Steps on scale



Consequence

Food reward given

Antecedent Arrangements

Antecedent = anything that happens right before a behavior that might cause or signal the animal to perform the behavior.

“Antecedent arrangement” refers to the collective set of variables that may increase or decrease the likelihood of a behavior occurring.



Environmental

- Weather
- Time of day
- Lighting
- Noise
- Aviary layout
- Presence of other animals
- Visual distractions

Biological

- Motivation for reward offered
- Satiation level/time since last meal
- Health
- Injuries
- Hormonal Cycle (breeding, molting, migration)

Event-Based

- New object/person
- Sudden noises
- Environmental changes
- Recent stressful event

Setup/Training

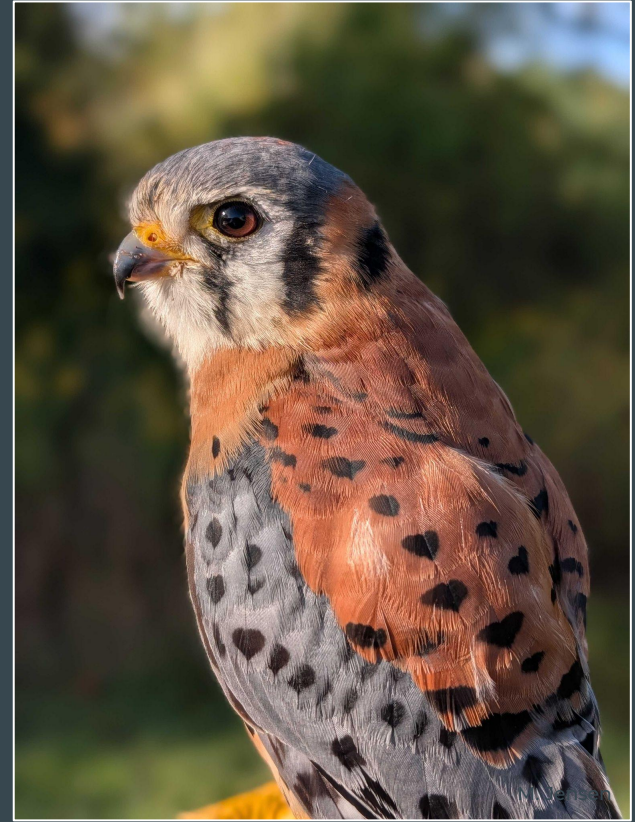
- Type of equipment used
- Placement of equipment
- Type of cue or prompt
- Type, size, and timing of rewards
- Sequence of behaviors
- Trainer positioning

Social/Trainer

- Familiarity with trainer
- Trainer mood/behavior
- Previous interactions
- Appearance of trainer (e.g., clothes)
- Presence of other humans

Planning antecedents

- 1) We want to set up our birds for success
- 2) Lower expectations if antecedent arrangements aren't ideal
 - a) When exposing an animal to less familiar/somewhat scary stimuli, stick to easy/mastered behaviors
- 3) Plan sessions around one key antecedent not being “ideal” to build confidence/exposure
 - a) Example: steadily increase how many humans are standing outside the enclosure



The Animal-Trainer Relationship

Trust Fund

Positive
interactions
(aka trust
deposits)

Negative
interactions
(aka trust
withdrawals)

Lots of trust/Comfort

Neutral

No trust/Fear

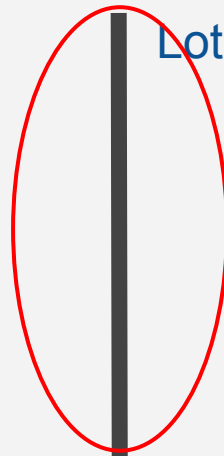
Building trust takes
patience and
repeated positive
interactions

Loss of trust occurs
whenever there are
negative interactions
or events

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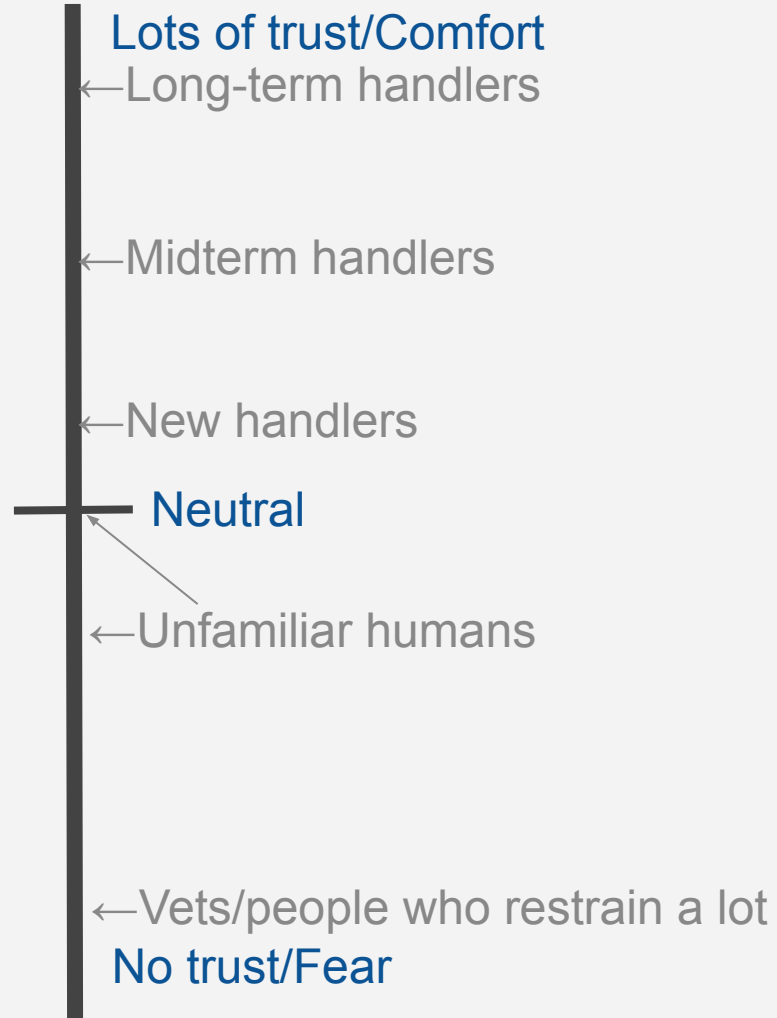
No trust/Fear

Minimize trust withdrawals (negative interactions) and maximize trust deposits (positive interactions) to maintain a high level of trust. We want to get to and stay in the positive zone (red circle).

Trust Fund

Positive
interactions
(aka trust
deposits)

Negative
interactions
(aka trust
withdrawals)





Most likely to win a joust



Fred
Dashboard



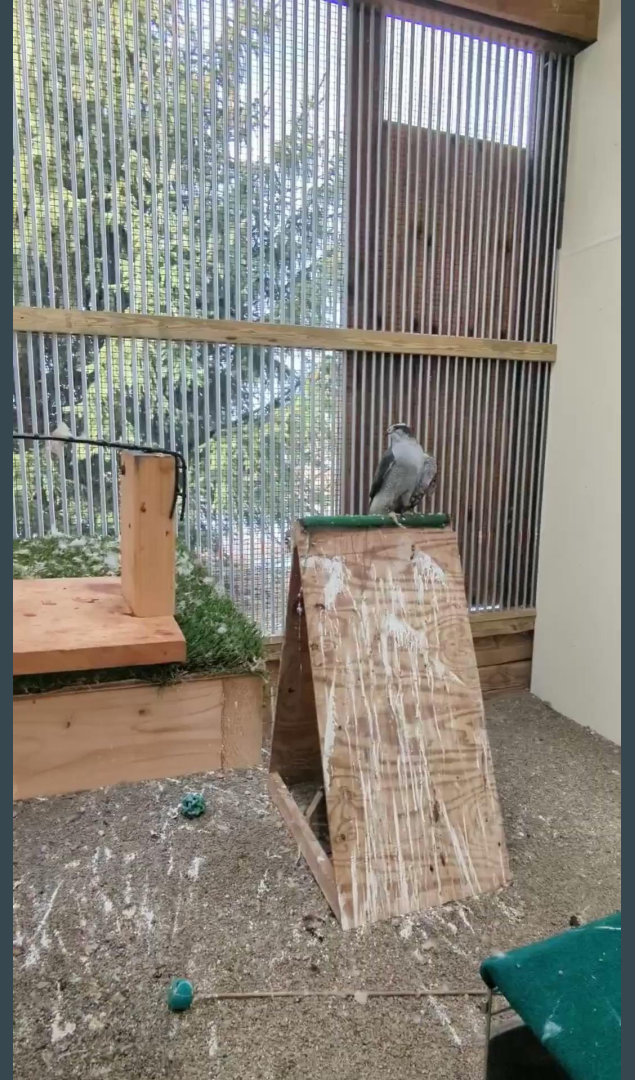
Fred is on

BIRD IS ON
DICATION

Fred: Use the food chute when
feeding this bird.

Training is a two-way conversation

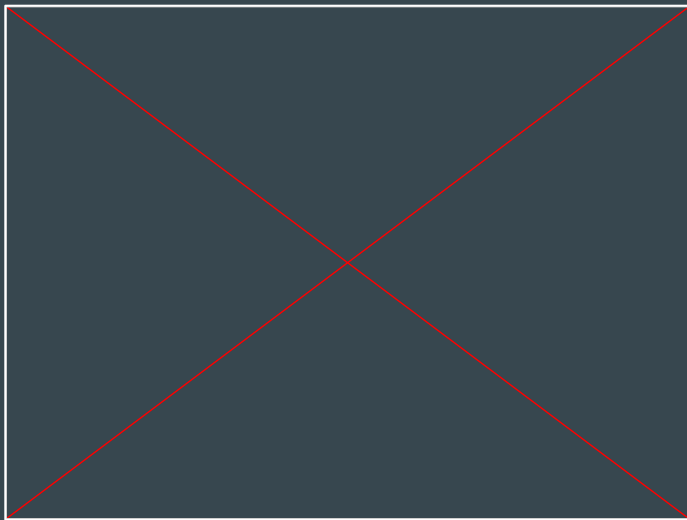
“If the learner is confused, the teacher needs to change the question.”



Enrichment Examples

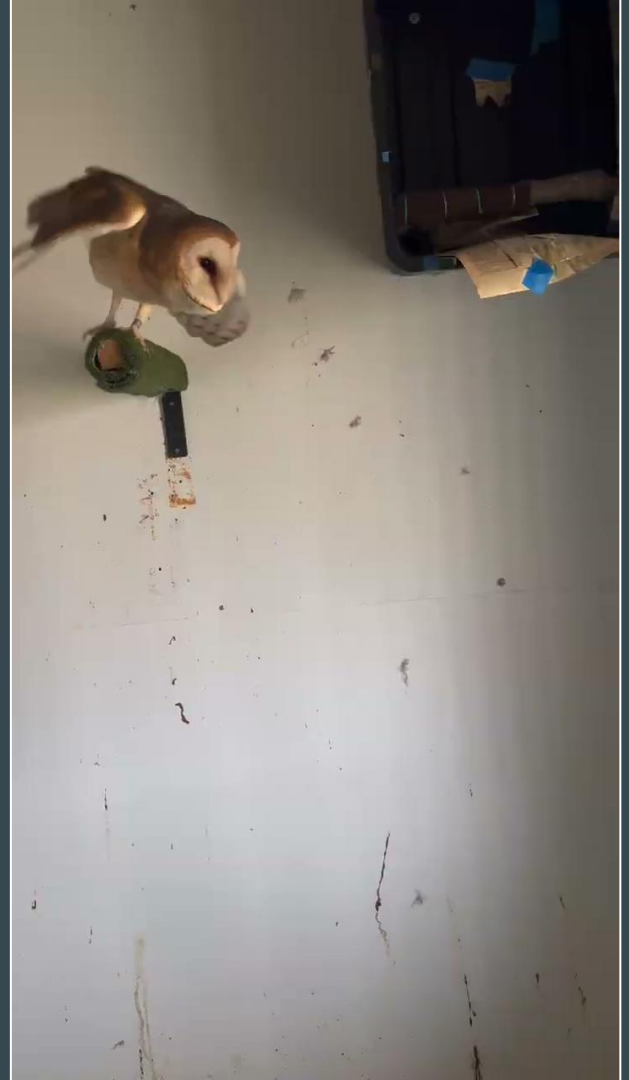
CRP Example #1

- Stevie the Barn Owl
 - Captive raised in research setting
 - Highly neophobic
 - No experience with the outdoors
 - Little experience with novel items
- Goal: Increase exploratory behavior and reduce neophobia
 - Given novel plastic, stuffed, and outdoor items and often associated with food



CRP Example #1

- First encounter with a pinecone:
 - “She was startled and immediately flew away from the pinecone to her “safe perch” and had no interest in approaching it again.”
- Second encounter - video



CRP Example #2

- Morty the Turkey Vulture
 - Highly neophobic, history of ripping up perches
 - TUVUs highly social species
- Goal = Encourage carcass feeding behavior for ripping/tearing (for both mental stimulation and beak health)
 - Multiple attempts to introduce various large food items (venison, lamb, etc.) with no success
 - Leveraged trainer relationship to encourage behavior



CRP Example #3

- Odin the Eastern Screech Owl
 - Fully flighted; history of ripping up turf
 - EASOs naturally gain a lot of weight in the winter time
- Goals = Encourage movement and prevent boredom
 - Feed live worms



CRP Example #3

- Didn't interact with worms for a few sessions, unless fed to him directly
- Is this enrichment idea a bust?



Opportunistic Enrichment

Opportunistic Enrichment*





Enrichment Making Activity

- Bird: Buzz the Turkey Vulture
- Goal: Forage on the ground and shred (natural Turkey Vulture behavior)

Directions:

4 teams of 4

You have 30 minutes to create a Cornell-themed paper enrichment item that can be placed on the ground in Buzz's room with food placed on/in it.

Everyone will vote for their favorite and it will be given to Buzz during lab!