Encouraging Natural Hunting Behavior in Captive Bobcats

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MultiD

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Introduction

Zookeepers at the Maryland Zoo need a way to stimulate the neglected behavior in the captive bobcats' hunting processes while maintaining equivalent or less effort during enrichment and feeding activities, so that natural hunting behaviors are observed.

Feline Hunting Process

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Identify → Stalk
Chase → Pounce
Swipe → Kill
Dissect
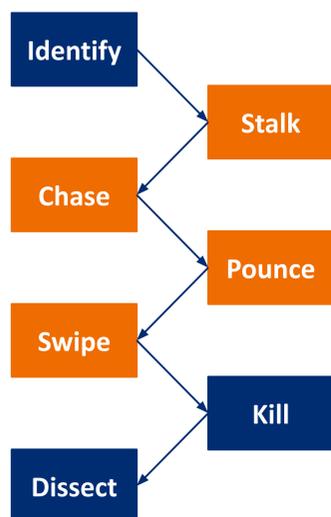
The feline hunting process is comprised of seven steps as detailed to the left. Current static enrichment methods implemented for the bobcats emphasize the identify, kill, and dissect steps, but neglect the key phases in between. Our solution focuses on reestablishing the bobcats' primal hunting needs, specifically in relation to the stalk, chase, pounce, and swipe behaviors.
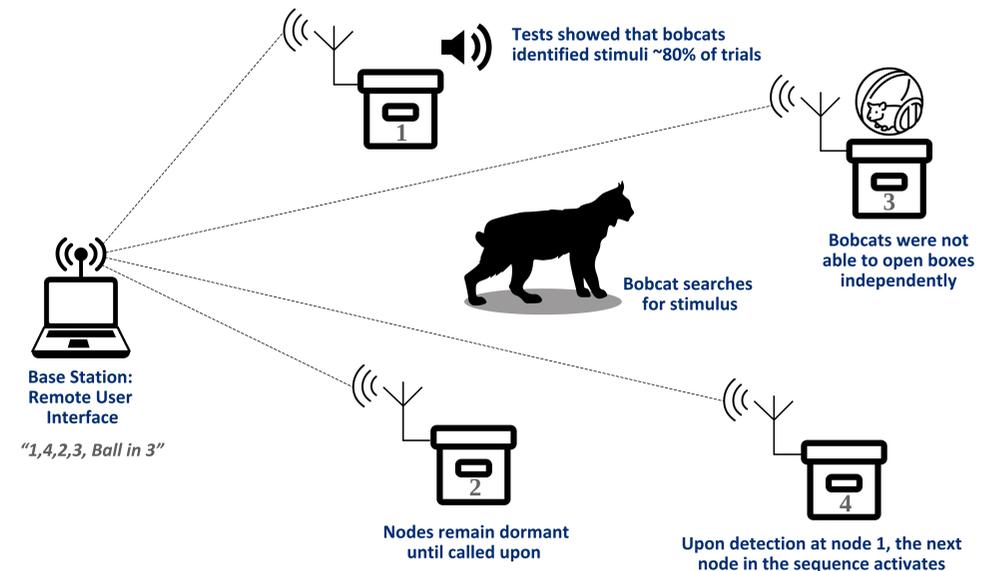
Acknowledgements

Solution: Burrow Nodes

Order of Operations

1) Zookeeper sets the order of the popups
2) Zookeeper loads and places prey ball into final node
3) RF signal initiates node system
4) Audio stimulus plays from first node in sequence
5) Bobcats interact with active node
6) Next node in the sequence activates
7) Final node releases loaded ball for bobcats to hunt

In order to properly stimulate natural hunting processes while feeding, we employed a system of nodes that aim to take the place of dynamic prey. The system of four nodes will display a prey noise to help induce the identify and stalk phase of the feline hunting process. The base station determines a random activation sequence of nodes to ensure dynamic enrichment, reinforcing the chase behavior. Once the audio plays, an ultrasonic sensor determines if the bobcat has interacted with the node within a specified distance and time. When the final node is activated in the sequence, a linear actuator releases a Boomer Ball (a tough plastic ball with holes to allow food items to fall out upon rolling) into the exhibit. The bobcats then chase, pounce, swipe, and once they get the food out of the ball, kill and dissect their prey.

Tests showed that bobcats identified stimuli ~80% of trials

Bobcats were not able to open boxes independently

Bobcat searches for stimulus

Base Station: Remote User Interface
"1,4,2,3, Ball in 3"

Nodes remain dormant until called upon

Upon detection at node 1, the next node in the sequence activates

Node Breakdown

2" stroke linear actuator holds and releases prey ball from node

Tie-down ring allows for keepers to anchor node in place with chain

Lockable draw latch secures door in place while providing access to interior for keepers

A02YYUW Waterproof Ultrasonic Sensor detects proximity of bobcat to node to determine success in hunt

12V 7Ah rechargeable battery powers node circuit for >1 month

XBee S2C Module facilitates wireless communication between nodes and base station

3W 8Ω Speaker controlled by DFPlayer mini module plays audio stimulus from SD card

Singular Node CAD

Arduino Mega 2560