Novel Object Test for Coyotes

This protocol describes a test that can be done to evaluate the boldness of coyotes. It pulls methodology from a recent paper on the subject (Breck et al 2019) and is designed to be repeated across the country with the goal to see if the phenomenon of bolder urban coyotes is consistent across the country, and what factors might promote or restrict the evolution of boldness in coyotes. The basic idea is to compare the behavior of coyotes that visit a scent lure with and without a novel object (small fence-like structure).

We welcome any collaborators to join the project, please sign up with this form so we can track whos running the protocol, where. Please also use this standard data sheet to document your work. While you are welcome to score your videos yourself for your own interest, for any larger scale comparison (and associated papers) we want to have all videos scored by the same group lead by Stewart Breck, so please send your videos (just the first coyote per camera) and data sheets to him for final evaluation. Any questions can be sent to Stewart, Julie Young, or Roland Kays.

Breck, S.W., Poessel, S.A., Mahoney, P. & Young, J.K. (2019) The intrepid urban coyote: a comparison of bold and exploratory behavior in coyotes from urban and rural environments. *Scientific Reports*, 9, 2104.

Field Setup

Time of year: We don't know the seasonality of this behavior so don't have specific suggestions other than to try and complete a full sampling of 60 sites within one season at each study area.

Sample Size: Aim for 30 camera-sites per treatment (e.g. 30 rural and 30 urban = 60 total), with each development level having 15 with the novel object and 15 having only the attractant with no sticks. Each city will have different levels of development, so just try to maximize the difference between rural and urban at each city. As a secondary objective, if you want to run more than this 60 cameras you could also run along the gradient between urban -rural to see if we can identify where the change occurs.

Distance between sites: To ensure independence between each camera-site use the diameter of average local home range size of coyotes as a minimum spacing. A recent review of coyote papers found an average of 11km^2 (3.8km diameter) for urban and suburban coyotes and 35km^2 (6.7km diameter) or coyotes living in 'natural' environments. (Šálek, Martin, Lucie Drahníková, and Emil Tkadlec. "Changes in home range sizes and population densities of carnivore species along the natural to urban habitat gradient." Mammal Review 45, no. 1 (2015): 1-14.)

Site Selection: In both areas you want to find a natural setting where the set won't be disturbed by people. Do not set directly on trails or roads, but nearby is ok (unavoidable in urban areas).

Camera Anchor: Put a post (T-post or U-bar) in the ground so that a camera could be mounted on the post at 0.4-1.5 m above the ground (whatever you need to get a good angle given local vegetation). Put in post 3 weeks prior to any trials starting so coyotes could habituate to the post.

Randomly select half the sites in each study area to be baseline without a novel object and half to be novel object treatments. Its ok to mount and lock the camera to a tree for security instead of the post, but still should have a post at the site near the camera to be consistent with sites that don't have trees present, since the post itself is also a novel object.

Attractant: At all sites, dig a small hole in the ground (~50 mm in diameter and 50 mm deep) ~3.5 m from the t-post. Place a heaping tablespoon of meat bait (Sweet Meat Predator Bait, Russ Carman, New Milford, Pennsylvania) in the hole and then stuff grass or leaves into the hole. On top of the grass place a fatty acid tab (plaster disc ~ 25mm diameter that is impregnated with a fatty acid scent, Pocatello Supply Depot, Idaho). Be mindful about leaving as little human scent as possible at the site: do not bring a dog when setting the camera, do not set with a large group of people, do not eat or urinate at the site etc…

Figure 1. Picture of a coyote approaching a novel object setup. Note this example has rope around only 3 sides but we want the rope across all 4 sides.

Novel Object: At the treatment sites establish a visual novel object that surrounded the attractant by hammering in 4 stakes made of processed wood (i.e. not natural sticks, untreated natural wood like these) at the corners of a 1 m^2 area around the attractant. These stakes should be sticking out ~1m above the ground. Tie rope (white parachord) at the top of the stakes forming a square around the 1m area.

Camera Trap: At all sites place a camera trap capable of recording video on the post (or a tree) about 3-5m from the objects, aimed at the objects. The exact make/model of camera trap is not important, as long as it uses an IR (not visible) flash and is silent. Longer video clips are better, if possible set for 30sec video clips. We will only be analyzing the first coyote to appear in the

video, so the duration of each camera deployment isn't super important, as long as you get at least one coyote.

Duration: We suggest a maximum test duration of 3 weeks (per site). If a coyote visits your site earlier you can move the camera.

Video Processing

We will only score the behavior of the first coyote to appear to ensure we aren't registering the same individual multiple times. We will consider video clips <5min apart to be part of the same visit. Each group can code the first coyote at each site for their own use, but need to send the video to Stewart Brek for final evaluation. We will also count the total number of coyote visits but wont code behavior of them.

For each visit of a coyote to the site we will record:

- Distance- Time spent by the coyote in 3 distance classes from the attractant:
    - far (>1 body length away from attractant),
    - close (<1 body length),
    - touching (making contact with attractant).
- Behavior- Time spent by the coyote in 4 behavioral states: vigilant, investigating, comfortable, or jumping/running away.
    - Vigilant behavior indicates caution or apprehension, categorize coyotes as vigilant if their tail is tucked, they walk hesitantly toward the object, flinch, pace around the object, or assume a crouched position.
    - Investigating behavior indicates the coyote is not concerned about the attractant or novel object, which include a tall posture, an erect tail, directed travel toward the object without pausing, and a relaxed stature.
    - Comfortable is the time spent performing any of the following behaviors: shaking, rolling, urinating, defecating, digging, pawing, scratching, stretching, eating, or taking the bait.
    - Jumping and running away shows an animal particularly shy about the object.

Site-level data

For each camera-site please also record the start and end time of each camera deployment, and the time and duration of each coyote visit (not just the first one). This will give us some measurements of relative abundance of the local coyote population we can compare across sites. Here's the data sheet.

Equipment needed

- Camera mounting post
- Video camera trap, locks, cables, batteries, memory card
- 4 wood stakes ~1.2m (e.g. like these)
- 4m rope (white parachord like this)
- Carman's Sweet Meat Predator Bait & tablespoon

- fatty acid tabs [Stewart Breck has a big supply, contact him and he can mail them to you].
- Hammer, shovel