Reading PeeMails: Can Your Fox See Invisible Messages?

Do Foxes See Ultraviolet Signals?

Materials

A pet fox that understands the commands sit* *wait*** and *touch****

One A4 sheet of yellow coloured paper and cut into quarters (A6)

One sheet of white paper (for marking with invisible ink), cut into quarters (A6)

Invisible Ink

Black-Light Camera*****

Fox Treats (Blueberries or dog treats, etc)

Biro

Camera for recording sessions

Background

Scientists have long suspected that animals such as cats and dogs can see UV. Whether this is true for foxes also, remains unknown, but the possibility is valid.

Scientists have specialized and sophisticated equipment to test such theories, but we can at least begin to get people thinking about the question!

We train several foxes, independent of each other, to select a piece of paper with invisible ink on, over a grey one.

Hypothesis

All foxes tested will show the same selection and vision ability.

Process

1) Take 1 A6 sized sheet of white paper - in landscape position - and write the word “FOXY” with the UV pen. With a biro, label the **back** of the paper *UV1*, on the bottom right corner.

2) Use the black light camera* to check the UV pen is working and take a photo to document the result.

3) Take a second A6 sized sheet of yellow paper and label the back of the paper *UV2* in the bottom right corner. Double check it under the black light and document the results.

4) Choose a well lit and quiet place to begin your training and set your camera up ready; in a manner that ensures the training session and its results can be clearly seen.

5) Get your fox sitting and waiting a few feet in front of you. Make sure you have your treats and the two pieces of paper to hand.

6) With the *UV1* piece of paper in your left hand and the *UV2* paper in your right hand, present the pieces of paper simultaneously (so the label at the back is facing the keeper), whilst also giving the command to *touch*.

7) When the fox “touches” the white piece of paper with the UV writing, reward and treat.

8) Continue the above process (steps 4-7) until your fox gets the hang of the game. At which point, and begin randomly switching positions, repeating this process until your fox is correctly selecting the white UV1 paper correctly each time.

9) Now we know your fox can select the white paper from the yellow paper, it is time to introduce the next level. Take a fresh sheet of A6 white paper and write UV3 on the back, bottom right corner.

10) With the UV1 sheet in your left hand and the UV3 sheet in your right hand, repeat the steps 4-8.

11) If you think your fox has grasped it and can see the UV writing you can really test it by presenting three sheets of paper, one plain, one with the words “FOXY” in UV pen and one with the word “FOXY” in biro.

Refinement Suggestions

Control for Other Senses:

- Foxes may rely on senses other than vision (e.g., smell, texture) to differentiate between papers. To ensure that the fox is responding to the UV signal alone, consider controlling for smell by handling the paper with gloves and making sure all materials have the same scent.
- Use multiple sheets of paper that are visually identical in normal light (but differ only under UV light) to prevent reliance on color or other visual cues.

More Sample Foxes:

- Testing with more than one fox would improve the validity of your results. This will help to rule out the possibility that a single fox might exhibit individual behavior or preferences unrelated to UV perception.

Blind Testing:

- A double-blind setup would reduce bias. Involve an additional person who doesn't know which paper has UV markings so they can observe and record the fox's choices without influencing the outcome.

Vary the UV Writing:

- Instead of just using one word ("FOXY"), introduce multiple UV symbols or words. This would help determine if the fox is truly identifying UV light or merely responding to the presence of a single word.

Time Factor:

- Foxes, like many animals, may take some time to learn a task. Make sure to account for learning curves, and keep track of how many sessions are needed before they consistently perform well. This could provide insight into whether their success is due to visual recognition or learned behavior.

Measure Responses to Invisible Ink Without UV Light:

- In addition to using a black light camera to check that the UV writing is functional, you could periodically test the fox with the paper in an environment without the UV light to see if they still respond to the marked paper. This would help confirm that the fox is reacting to UV-visible cues, not other factors.

Randomization of Trials:

- To ensure the fox isn't just selecting based on position or pattern, regularly randomize which hand holds the UV-marked paper, as well as the position of the different papers.

Statistical Validation:

- To draw reliable conclusions, you'll want to ensure the results are statistically significant. Track the number of correct versus incorrect selections over a large number of trials, then analyze the data to see if the fox's success rate is beyond what you'd expect from random chance.

Challenges:

- Even if the fox correctly selects the UV-marked paper, it doesn't necessarily confirm that it "sees" UV light. The fox might be responding to other factors, like the fox's training experience, external lighting conditions, or subtle cues you may not have noticed.

- Foxes are intelligent but also independent animals, so they may not always follow training as predictably as a dog might. Training consistency and patience will be key factors in the success of the project.