

Science Matters! is a series presented in collaboration with the Connecticut Academy of Science and Engineering. For more information, visit [www.ctcase.org](http://www.ctcase.org) or call 860.571.7143.

By Angie M. Johnston, Graduate Student, Psychology, Yale University

## Getting Inside the Mind of a Dog

Many of us wonder what our dogs are thinking. For example, have you ever wondered if your dog knows if you did something on purpose or by accident? At the **Canine Cognition** Center at Yale, we create games that are specially designed to uncover how dogs think and make decisions. Families from all around New Haven bring their dogs to our center to help us find out.

In one study, we set up a game of hide and seek. In this game, we hide a treat, and the dog tries to find it using a clue from our researchers. The “clue” we use is a brightly colored object that the researcher places on top of the hiding location. On some **trials**, the researcher carefully reaches toward the hiding location and places the object on top. For other trials, the researcher gets distracted and accidentally drops the object in the wrong place as she’s reaching for the right hiding location. We can then see if these dogs will look for the treat where the object accidentally was placed or whether the dog will look where the researcher was trying to put the object.

One of the more exciting parts of our job is thinking critically about how to design studies that do not have any **confounds**. For instance, what if dogs find the treat just by using their powerful sense of smell? Dogs have millions of **sensory neurons** inside their noses, so researchers want to make sure they need to use more than just their sense of smell to find the treat. To do this, we make sure all of the hiding locations smell like treats by rubbing them with treats before the trials. That way we can make sure dogs use what they know about the researcher’s actions, and not just their noses, to solve the task.

Angie Johnston works with dogs at Yale's Canine Cognition Center



## Skills and Knowledge:

Studying canine cognition, or any type of animal cognition, requires a strong background in psychology and biology, and a good understanding of the scientific method. The best way to prepare in middle school and high school is to study biology and to do as many science projects — including science fair projects — as possible, particularly on topics in animal cognition or behavior. To have a career in animal cognition you need to first attend a 4-year college and then earn a Masters or PhD.

Connecticut State Department of Education (CSDE): Science Framework

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena
- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation
- Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists

## WORDS TO KNOW



**Canine:** Any animal in the biological genus *Canis*. This genus includes species such as dogs, wolves, coyotes, dingoes, and jackals.

**Cognition:** The process of thinking or learning.

**Confounds:** Factors other than the ones you are testing that may lead to the same results you were predicting. These are important to avoid because they prevent you from testing the question you really want to study.

**Sensory neurons:** Nerve cells that respond to certain types of information in the environment (like smells) and send a signal about this information to the brain.

**Trial:** A single observation of the behavior being recorded. In an experiment, it is often necessary to do repeated trials to increase your confidence in the results.



## Meet the Scientist

Dogs have always fascinated me. Even when I was very young, I read books on dog breeds to learn about their behavior. As I got older and became increasingly interested in science, I realized I could use science as a tool to learn what my dog, Ginger, was thinking. Now, as a PhD student at Yale, I have the opportunity to answer my biggest questions about what dogs are thinking at the Canine Cognition Center.

## Hyperlinks:

<http://www.nature.com/scitable/knowledge/library/animal-cognition-96639212>  
[http://www.biokids.umich.edu/critters/Canis\\_lupus\\_familiaris/](http://www.biokids.umich.edu/critters/Canis_lupus_familiaris/)  
[http://pbskids.org/dragonflytv/show/colorblind\\_dogs.html](http://pbskids.org/dragonflytv/show/colorblind_dogs.html)

**For Students and Teachers Making Curriculum Connections and Connecticut State Department of Education (CSDE): Science Framework Common Core State Standards (CCSS): Mathematics**

- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them
- CCSS.Math.Practice.MP3 Construct viable arguments and critique the reasoning of others
- CCSS.Math.Practice.MP5 Use appropriate tools strategically

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