

How Sharp Is Your Dog's Sense of Smell?

Learn about the incredible sensitivity of your dog's nose. Thanks to their unique anatomy, find out how they can detect odors at minute levels.

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STORY AT-A-GLANCE

- Your dog's sense of smell is extraordinary thanks to several special anatomic features of the canine nose
- Recently, researchers in Finland set out to determine the lowest concentration of a particular odorant — Eucalyptus hydrolat — trained dogs could detect
- Their findings demonstrate the exceptional olfactory acuity of dogs, and their ability to discern minute traces of scent; the study also highlights the paramount importance of consistency of the scent source when training dogs in K9 nose work
- K9 nose work is a fun activity dog owners can enjoy with their canine companions; it evolved from the training professional scent detection dogs receive; any dog can get involved in nose work
- Dogs are driven by their noses, and dragging them through a walk too quickly can be a frustrating experience for a pup eager to explore the enticing scents wafting by; at least once a day, make a point to take your dog on a "sniffari" — allow her to lead and sniff everything to her heart's content

Most of us recognize that canines have sharp noses, but the degree to which their miraculous sense of smell is able to detect "odorant molecules" is almost beyond comprehension.

Some of the specifics of dogs' super sniffers are described in a 2012 study comparing the canine ability to detect the odor of cancer to laboratory testing:¹

- Dogs possess an extraordinary dimension of their olfactory epithelium (up to 170 cm vs. 10 cm in humans)² (the olfactory epithelium is a specialized type of tissue inside the nose)
- They also possess a huge number of olfactory receptors (over 200 million vs. 5 million in humans)
- There is also a "dense innervation of [dogs'] olfactory mucosa and their ability to 'sort' meaningful incoming odors from those that are unwanted or unnecessary"

Bottom line: These very special anatomic features of the canine nose give dogs the ability to detect even minute amounts of a particular odorant — an ability estimated to be one million times more efficient than in humans!

Dogs Can Detect Minute Traces of Scent

Recently, researchers in Finland set out to determine the lowest concentration of a particular odorant — Eucalyptus hydrolat — trained dogs could detect. (Hydrolats are the natural waters that are collected when plants are distilled to extract their essential oils.)³ The scientists chose eucalyptus because it is often used in K9 **nose work** (scent detection)

training. The goal of the study was to discover the scent detection threshold of dogs by progressively diluting the hydrolat until they could no longer identify it.

The results⁴ were fascinating, demonstrating that dogs trained to detect eucalyptus could do so even when the scent was diluted to “remarkably low ratios.” The dogs in the study successfully identified the eucalyptus scent at concentrations ranging from 1:1017 to 1:1021, highlighting their exceptional olfactory acuity and ability to discern minute traces of scent.

In Nose Work, Consistency of the Scent Source Is Crucial

Another goal of the study was to use analytical spectroscopy to investigate the contents of 10 commercial eucalyptus hydrolats. The researchers’ examination revealed variations in the ingredients of the hydrolats, which emphasizes the importance of consistency in scent sources during nose work training for dogs. The study findings shine a light on two crucial points regarding the training:

1. When properly trained, dogs can learn to identify extremely low concentrations of scent, which of course showcases their amazing sense of smell
2. The consistency of the scent source is of paramount importance in training dogs for various purposes

The information gleaned from this study has significant implications for canine sports such as nose work, because consistency in scent sources ensures fair competition and reliable performance among participating dogs. In addition, consistency in scent sources is crucial for obtaining reliable, reproducible results.

Would Your Dog Enjoy Nose Work?

K9 nose work, also called nose work, fun nose work, scent work, and search work, was developed in 2006 and is sanctioned by the National Association of Canine Scent Work (NACSW). The activity is an offshoot of the training that professional scent detection dogs (“sniffer dogs”) receive. Elements of the training are used in K9 nose work, but for recreational purposes only.

Nose work encourages your dog to use her natural hunting drive and unique talent for picking up scents and locating the source. The training teaches your dog to find one of three scents, wherever you decide to hide it. In nose work competitions, there are four locations involved in searching: interiors, exteriors, containers, and vehicles.

K9 nose work isn’t an obedience-based activity. Instead, it works with your dog’s natural instinct to hunt and track scents. There are few commands given during the activity, and no attention to the owner is required while the dog is working.

Any dog can participate in nose work, so you don’t have to have a typical sniffer dog (e.g., a Labrador Retriever, German Shepherd, or Bloodhound) to get your pet involved in the sport.

Some dog guardians have found nose work to be a great supplement to a behavior modification program. Focusing on scent detection can help reactive dogs learn to tolerate the presence of other dogs. It can help shy dogs grow more comfortable with their surroundings, and it encourages distracted dogs to stay on task.

Nose work is also beneficial for **senior dogs**, dogs recovering from surgery or an injury, dogs with hearing loss or eyesight problems, and retired service, working or competition dogs. It can also provide a great outlet for hyperactive dogs and dogs with special needs who may not be able to leave the house easily.

How the Training Works

The first step in nose work training is building a dog's desire to hunt. Positive reinforcement is used for the dogs, while the owners learn how to read their pet's unique hunting behaviors and signals.

The next step is to add different search settings while continuing to build the dog's desire to hunt and the owner's ability to read their dog's behaviors and communication signals.

The third step involves continuing to build on the first two, and also communicating to the dog that one of the three target odors is what he should hunt for. Next, the dog is introduced to the other two target odors.

In the final level of training, the dog continues to increase his desire to hunt for the target odors, and the working relationship between owner and dog is tested with progressively more challenging search scenarios.

There are levels of training beyond the initial five, with the highest level reserved for dogs who will go on to enter nose work competitions.

Make Sure Your Dog Goes on Regular 'Sniffaris'

Regardless of whether or not you get your dog involved in nose work, it's extremely important to offer him opportunities to sniff his surroundings when you take him for walks.

Imagine going for a stroll with blinders on that prevent you from seeing anything but what's right in front of you. This is how your dog feels if you're constantly pulling him along on your walk and rushing him past intriguing scents.

"It would be like humans going on a hike and being whisked along too fast to visually register the trees, the flowers and the view of the mountains," Karen B. London, Ph.D., a certified applied animal behaviorist and certified professional dog trainer, wrote in The Bark.⁵

Often when dog owners walk their pet, it's with the intent of getting around the block quickly. You may have a set path in mind, a time limit to stick to and the expectation that you're the one leading the walk, and that's fine — sometimes. But for your dog's happiness and mental well-being, giving him a chance to stop and smell the roses — literally — is important.

Dogs are driven by their noses and dragging them through a walk too quickly can be a frustrating experience for a pup eager to explore the enticing scents he's encountering. At least once a day, make a point to take your dog on a "sniffari." Let him take the lead and sniff, sniff, sniff to his heart's content.

Sources and References

¹ [Lippi G, Cervellin G. Canine olfactory detection of cancer versus laboratory testing: myth or opportunity? Clin Chem Lab Med 2012;50\(3\):435-439](#)

² [Williams H, Pembroke A. Sniffer dogs in the melanoma clinic? Lancet 1989;1:734](#)

³ [Base Formula. What are hydrolats / hydrosols & how to use them, May 31, 2018](#)

⁴ [Turunen, S. et al. Scent Detection Threshold of Trained Dogs to Eucalyptus Hydrolat, Animals 2024, 14\(7\), 1083, April 3, 2024](#)

⁵ [The Wildest, December 13, 2022](#)
