

Through the Nose

by Frances Killea



Every day, our senses tell us about the world. We taste, touch, smell, hear, and see things, and what we experience helps us learn. As we store more and more information in our memory, we are able to decide how to act in different situations based on the knowledge we have gained through our senses. For example, if you've ever touched a hot stove, your sense of touch quickly told you that *OUCH!* the stove is too hot. We learn that the high heat can hurt us, and we know the next time we walk into the kitchen not to touch the stove when it's on!

Animals learn the same way we do: by using their senses. A dog's eyes and ears and nose work the same way that ours do, by detecting sights, sounds, and scents. Dogs' noses, however, are super-powered compared to ours. Let's get gross for a minute, and think about the inside of our noses. Membranes, thin, film-like layers that line the inside of the nasal cavity, help us smell because they are packed with tiny scent-tracking hotspots called olfactory receptors. Humans have about 5 million of these receptors, while dogs have 220 million. If you were to lay a dog's nasal membranes out flat, they would be able to cover its body!

So what does this mean? It means that dogs can smell a lot more things a lot more strongly than we can. Their powerful sense of smell can pick up scents that we don't even know exist, and a large portion of a dog's brain is dedicated to interpreting what those scents mean. Dogs constantly sniff: the air, the ground, food, furniture, other dogs, and humans, and it's all because they are trying to make sense of the world around them.

What do dogs do with all of the information they collect with their noses? The scents that dogs pick up help them understand their surroundings. Dogs store what they learn, making memories that guide their future actions. When trained to discern tiny differences in scents, dogs can do remarkable things. For instance, dogs can learn to sniff out drugs and explosives (have you ever seen a dog with a security guard at a big office building or an airport?). They can also, with training, pick out the one stick thrown for them from a heap of many, based on the scent of their owner. With that kind of olfactory ("olfactory" means that something is related to the nose and scent) talent, it's no wonder dogs are often used in searches for missing hikers or people lost in avalanches!

Also, dogs recognize one another by scent; a mother dog knows which puppies are hers by how they smell, for example. Plus, dogs can determine pretty quickly what another dog is like, and whether or not they're going to get along, by detecting specific scents on other animals that indicate age, gender, and even mood.

Dogs know humans by scent, too! You don't notice it, but you have a unique scent, and your dog - and other people's dogs - can tell the difference between you and someone else in large part because of your specific smell. Pets come to associate the scent of their owners with home and safety, as human and dog become more familiar with one another. Some scientists even think that dogs can tell how their owners are feeling based on smell, and one study in England tested the ability of dogs to detect cancer in human patients.

A simple way to think about how dogs can do these incredible things is to look at the process like a chain. A dog sniffs, breathing in a lot of different scents, which are then interpreted by its brain as information about the environment. The dog learns about its surroundings that way, and with training - repeated exposure to a certain scent in order to make it easily recognizable - stores what it has learned in its memory, and is able, in the future, to act on what it knows. That's how dogs help rescue teams find missing people and help policemen locate dangerous substances in searches, and that's how your dog knows it's you when you come home after school.