Tracking, Trailing, and Air Scenting: What Is Your Police Canine Really Following?

Police Canine Science and Training — Article 6

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A police canine handler arrives at a burglary scene. The suspect was last seen running through a residential neighborhood about twenty minutes earlier. The dog lowers its head and moves along a sidewalk, then raises its head, turns toward a grassy area, and pulls in a different direction. Is the dog off the track?

Perhaps, but not always. The dog may be following scent that moved away from the suspect's path, scent carried by the wind, scent on nearby surfaces, or scent from other people. The handler cannot tell which without more information. The main point is that *a dog follows the scent it can detect, not an invisible line showing where a person walked*.

What Is Human Scent?

People constantly release a mix of chemicals and biological material, including substances from skin, sweat, oils, microbes, breath, and clothing. Some float in the air; others stick to particles or surfaces. Human scent is not a single substance. It changes depending on the person, what they do, their clothes, and the environment, and scientists are still learning which parts dogs use. Some of this scent can stay around after the person has gone.

What Are Tracking, Trailing, and Air Scenting?

Tracking usually means following scent linked to where a person has traveled. The usual idea is that a dog follows disturbed ground, crushed plants, or footprints, but this can lead handlers to expect the dog to follow every step. A dog may use scent left by the person, scent on plants and surfaces, and scent carried in the air, and the mix changes depending on the environment and training. So, the dog might follow a track while moving to one side of the actual path.

Trailing usually means following the scent of a specific person, often starting from an item with their scent. Air scenting means finding scent carried by the air; the dog may lift its head, change direction, and move toward it. Airborne scent can also influence dogs trained for tracking or trailing, so a change in behavior does not always mean the dog has stopped the task. A raised head does not prove the dog has found the right person's scent, and it alone does not show whether the dog is air scenting or trailing.

These terms are not standardized, and different organizations define them differently. Labels do not reveal which scent sources a dog is using. Ask instead: What has the dog been trained to follow? What information is in the environment? How does the dog behave when that information changes? What shows the dog is following the right person's scent?

Footprint vs. Scent Trail: Why Dogs Work Away from the Track

A person walking across a field disturbs plants and soil, moves material between shoes and ground, and releases chemicals and particles from their body and clothes, some of which the wind carries away from the path. The result is more complicated than just a line of footprints, and the dog's position is not always where the person was before. Do not think of the track as just a simple trail of footprints.

For example, if a person walks north along a sidewalk with a steady west-to-east wind, scent may drift east of the path. A dog coming from the east may find it and follow it while staying east of the sidewalk. A handler expecting the dog to stay on the sidewalk might wrongly think this is a mistake. But the opposite mistake can happen too: a dog leaving the known path might be following unrelated scent or reacting to a distraction. Use evidence, not guesses, and use known tracks and controlled exercises to compare the dog's behavior to the real path.

How Wind and Intersections Change the Search

Wind carries chemicals and particles through the air, so a dog working downwind may find scent before reaching the path or source. Airflow is not smooth, though. Buildings, cars, trees, fences, and land shapes cause uneven air movement, so scent may be stronger or weaker in different places. A dog may move back and forth, change direction, or briefly lose the scent while gathering clues. Wind direction alone cannot explain every movement; surfaces, temperature, and land features also matter.

Intersections add more challenges: changing air movement, passing vehicles, many people crossing, and different surfaces. The dog may slow down, circle, or check several directions. This might be the dog gathering information, but it might also have lost the scent or been distracted by something else. Handlers should not force the dog to go a certain way just because it seems logical. Training should use intersections to teach and test the dog's skill, and handlers must learn when to help and when they are getting in the way.

Scent Discrimination and the Starting Point

In a residential area, many people, animals, vehicles, and food can create competing scents, so the main question is whether the dog can tell the right person's scent from others. Discrimination is a skill the dog learns and must show. Training should include situations like two people moving through an area at different times or crossing paths, with the trainer knowing the correct routes. Carefully planned blind exercises can provide more information, but scent mixing and transfer make results harder to understand, and a successful outcome does not prove all other scents were ruled out.

The starting point is important too. The last-seen location may have scent from several people and might have been disturbed by officers or witnesses. If a suspect was last seen near a doorway, the dog's first behavior might reflect the suspect, someone else, or scent already there. Handlers

should know what is clear and what is unknown about the starting point, should not assume all scent there belongs to the suspect, and should train with realistic starting conditions.

Track Age

Tracks are often called fresh or old, but time alone doesn't determine whether scent is still there. Weather, surfaces, plants, wind, rain, temperature, and foot traffic all affect scent. A recent track might be hard to follow in some conditions, while an older one might be easier in others. Age is just one factor, not a fixed rule. Train with tracks of different ages in different conditions and carefully record actual performance.

The Long Line and Blind Training

The tracking line is part of how the dog and handler communicate. Tension, the handler's stance and movement, and physical control all affect the dog's behavior. A handler who often pulls the dog one way may interrupt the dog's independent scent work, while one who just follows without paying attention may miss when the dog loses the scent. The goal is to let the dog explore while staying in control, which means training both the handler and the dog.

In many exercises, the handler knows the tracklayer's route. This helps when teaching a new skill because the handler can spot mistakes and control the difficulty. But doing known-track work too often risks the handler accidentally guiding the dog through body position, line tension, or movement, and the dog may start to depend on that help. A team can seem very successful even if the dog's independent skill has never been properly tested. Blind exercises, where the handler does not know the route, lower this risk. They are not right for every learning stage, but they are especially useful for checking that a learned skill works on its own.

A Successful Track Does Not Explain Every Behavior

When a dog follows a track and finds the tracklayer, that is a success. But questions remain: Did the dog follow the right scent the whole time? Did the handler help guide it? Did the dog lose the scent briefly? Did it find the person by airborne scent near the end? Were there accidental clues? These questions do not lessen the success; they help explain what the performance shows. A dog can find a person without following the exact path, and a dog may show good scent work without finishing the whole track. Judge how well the dog worked separately from the final result.

What Should Handlers Document?

Records should include more than distance and whether the person was found. Useful details include starting conditions, track age, terrain, surfaces, weather, wind, route difficulty, chances for scent mixing, handler knowledge, line handling, observed dog behavior, and the result. For example: "Twenty-five-minute-old training track through a residential area, crossing two intersections over pavement and grass. Moderate crosswind. Dog worked downwind of the known route in one section, then returned toward it. Handler did not know the track direction. Dog located the tracklayer. Additional training planned with multiple crossing tracks." This gives a fuller picture

than “Successful 800-yard track” and helps the team identify areas for improvement. They should know that a dog’s track does not always show the person’s exact path. A dog may find scent that has drifted from the route, a change in direction can have many causes, and finding the person does not prove the whole route was followed exactly. Likewise, a failed track does not always mean the dog missed the right scent; weather, scent mixing, starting information, and handler choices all affect results. Separate observations from conclusions and make claims about which scent the dog followed or why it changed direction only when evidence supports them.

The Most Important Lesson

Tracking, trailing, and air scenting are useful terms, but they do not fully explain how a dog finds a person. Human scent is complex: it can be left on surfaces, carried through the air, moved between materials, and changed by the environment. A dog may find important scent away from the person’s path and may use different scent sources during one search. A handler cannot tell which scent the dog is following just by watching its head or movement.

Training should develop dogs that find and follow important scent clues in different conditions while responding well to their handlers. The dog is not following a line drawn on the ground. It is working in an environment full of scent information that humans cannot directly sense. Understanding this makes us better trainers, handlers, and more accurate witnesses when explaining canine tracking.

Research and further reading

The following publications provide scientific foundations for canine olfaction, human scent, tracking behavior, and scent discrimination. Some concern general olfactory science rather than direct evaluations of police tracking operations.

1. Thesen, A., Steen, J. B., & Døving, K. B. (1993). Behaviour of dogs during olfactory tracking. *Journal of Experimental Biology, 180*, 247–251. Examines canine behavior during olfactory tracking.
2. Craven, B. A., Paterson, E. G., & Settles, G. S. (2010). The fluid dynamics of canine olfaction: Unique nasal airflow patterns as an explanation of macrosmia. *Journal of the Royal Society Interface, 7*(47), 933–943. Explains airflow and odor sampling in the canine nose.
3. Settles, G. S. (2005). Sniffers: Fluid-dynamic sampling for olfactory trace detection in nature and homeland security. *Journal of Fluids Engineering, 127*(2), 189–218. Reviews physical principles of odor sampling and transport.
4. Schoon, G. A. A. (1996). Scent identification lineups by dogs (Canis familiaris): Experimental design and forensic application. *Applied Animal Behaviour Science,*

49(3), 257–267. Examines canine scent identification and issues relevant to forensic applications.

5. Harper, R. J., & Furton, K. G. (2007). Biological detection of explosives. In *Counterterrorist Detection Techniques of Explosives*. Elsevier. Discusses chemical detection principles relevant to working dogs.
6. Miklósi, Á. (2015). *Dog Behaviour, Evolution, and Cognition* (2nd ed.). Oxford University Press. Provides broader scientific background on canine sensory abilities, learning, and behavior.