

Training for Scent Detection



There are many reasons to train a dog to search for, locate and indicate (report) a specific odor. What will be discussed here is training for the DSA scent detection competitions. It is intended that the training discussed here will not adversely affect any training that might be done in the future for professional work, but if you plan to use the dog in a professional capacity be advised that this information may or may not be complete enough for that goal. Utilizing a professional in the line of work of your choice is highly recommended.

DOG'S SENSES

A test of a dog's brain showed that at 1 part per 11 billion the BRAIN showed evidence of odor recognition. But the dog's BEHAVIOR didn't indicate the scent till 1 part per 4 billion. That is still an incredibly LOW concentration that the dog is indicating! A real world example is that search dogs have been used to locate civil war grave sites (<http://www.campnelson.org/PDF/spring03.pdf>). They can locate remains as small as a drop of blood (cadaver dogs) or a pin hole gas leak that is well underground. Bomb dogs can alert on a fingerprint left by someone that has handled bomb making material.

So there is no doubt that a dog's sense of smell is incredible (think about that the next time you douse yourself in perfume, cologne or bug spray!) but how do we put that ability to work for us? We simply need to teach the dog which scent is relevant, meaning which scent will earn the dog what he loves. Just as some dogs are able to find hidden toys they want, they will work to find the target odor because to them, that means toys (or food).

GETTING STARTED

There are a few different ways of getting the dog to recognize the target odor as relevant. One is classical conditioning and another is operant conditioning. Both will be discussed here and they can be used in conjunction.

CLASSICAL CONDITIONING

This is when the target odor is directly paired with something the dog loves, like food. Some people that raise puppies for scent detection jobs will feed the puppies their meals in a way that allows the pup to smell the target odor while they eat. This can be accomplished by drilling small holes in a dog food dish and putting the target odor under the dish at meal times. This creates a very strong association to the target odor(s). This can be done with adult dogs as well. Here is an inexpensive option:



Get two CLEAN (not previously used for food) paper cups/bowls, put the scent in the bottom cup and place the other cup on top. Put small holes in the top cup. Use your hands or tape to hold the containers together while the dog eats treats out of the cup.

Another alternative for toy driven dogs is to store a cloth toy, tug or old, well washed tennis ball in a container with the target odor. This allows the odor to cling to the toy. Playing with that toy associates the odor with the play. The toy cannot be used as the scent object for the test. But any means of combining what the dog likes with the target odor (while making sure the dog can't ingest the target substance) will work for classically conditioning the dog to love the scent.

CAUTION:

Because dog's noses ARE so acute, you'll want to store the target odor in a way that prevents the dog from randomly smelling the scent when you are not training. If it sometimes means good stuff and sometimes it's supposed to be ignored, that will confuse the dog and reduce the intensity of his search. So get an air-tight glass or metal container. Why not plastic? That's because you don't want the smell of the plastic to mingle with your target odor. Otherwise, the dog might think he is supposed to look for the combined scent, or he might alert on plastic alone (half the target scent).



You'll also want to use caution to not "contaminate" various surfaces with the target odor (or treat residue). Wash your hands after handling the target odor or put it in a pouch you can handle by just the strings or wear gloves to minimize the spread of the odor. If you are working with human remains, gloves are recommended to prevent the spread of any potential diseases that might be on the items. If you need to move the container with the target odor, it's recommended that you also handle other non-scent containers so that the smell of your recent handling doesn't become an indicator to the dog.

OPERANT CONDITIONING

Since a picture is worth a 1000 words, video must be even better right? The first video "Search, Locate, Report" on this page: <http://www.i2ik9.com/video.htm> is a quick example of how to use a process called "back chaining" to teach the dog that the scent is the cue for a specific behavior.

In the video, that behavior is sit. The dog's name is Patch and the handler is Officer Steve White. Steve travels the world to teach police officers, search and rescue teams and competitors how to teach their dogs the behaviors they need to master. He uses reward based training and if he is presenting a seminar near you- ATTEND! You will learn a LOT. Some of the info in this article is from a seminar of his I attended in April of 2011.

Operant Conditioning is conditioning the dog to "operate" the environment to create a reward. The dog learns that it is his behavior (sit) in the presence of the target odor that causes the reward to be delivered. It's a fairly simple process if the steps toward the goal are sufficiently broken down so that the dog can understand what you want. The video example shows only "chunks" of the process. There are MANY more steps in between each progressive segment shown on the video. Note: Steve no longer directs the dog's search with his hand as was shown on the search of the vehicle.

TRAINING AIDS:

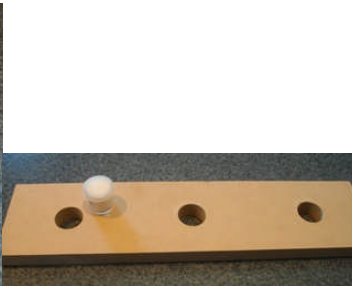
In the video, you saw a scent wheel. This allows the container with the scent to be moved around easily with minimal handling. Of course, you'll need to mark the container or the board in some way so YOU know where it is 😊

Here's a scent wheel made of film canisters (free from Wal-Mart photo dept.). You could also use un-used pill bottles- free from most pharmacies.



The lid is screwed to the board (which doesn't have to be round) and a hole is drilled in the bottom of the container. The scent is typically put on a piece of cloth or cotton ball or in a cloth pouch that fits inside.

Here's an alternative I made:



Container with a hole in the lid. Because all of them are plastic, the plastic scent gets ignored. All are filled with cotton balls, only one cotton ball has the target scent on it.

Scrap pieces of wood with holes drilled to slip the containers into.

I can move the boards around instead of having to handle the containers.

I found the containers at the craft store in the model paint department.

Another option for toy crazy dogs is called a Herstik wall. You can find more info about how to build and use the wall here:

<http://www.detectiondogs.com/articles/TrainingDetectionDogs.pdf>

The one below is free standing and used indoors using pipes as the hinge



Other options include boxes and containers found around the house, concrete blocks, unglued pieces of PVC pipe with holes drilled in them and natural hiding places found in

homes, businesses or cars. You do not need to be elaborate in the equipment you use, but the more variety you expose the dog to, the better able he will be at generalizing the search/locate behavior. You should also change the types of containers the scent is held in so the dog doesn't start looking for the scent of the container. Sterilized glass baby food jars make great, small containers that have no scent of their own. The jar is placed inside another container in such a way that the dog can't get to the glass.

TRAINING - BACK CHAINING

“Back Chaining” is when you train each component separately (and get the dog to fluency on each), then combine those well established behaviors by starting with the last behavior in the chain. By rewarding the last behavior in the chain, you make it the strongest, most well-known part of the chain. The dog is always working from the newest part of the chain toward the most established part. This increases the dog's confidence.

For example, on a search-locate-report chain: (C/R = click/reward)

Sit C/R

Sniff – **Sit** – C/R

See it – **Sniff it** – **Sit** – C/R

Find it – **See it** – **Sniff it** – **Sit** – C/R

Which behavior got the most rewards? The sit! So the dog tries hard to get to the sit part. What predicts that the sit will earn a reward? The sniff of the target scent! So the dog starts to work just as hard to sniff the scent, so he can do the sit, so he can get the reward. Each part of the chain builds value in the link ahead of it because it brings the dog a little closer to the reward.

However, if any part of the chain is not fluent (meaning the dog doesn't clearly know the behavior) it can cause the rest of the chain to fall apart. So be sure each behavior in the chain is strong (solidly understood in a multitude of environments) before you add a new link to the start.

BREAKING IT DOWN

Here is a possible training plan with the steps broken down. You would work multiple repetitions of each step to be sure the dog solidly understands each one before you build on it. Practicing/rewarding correct responses is good! By repeating each step even when you think it's clear the dog understands it, you are forming a solid base to build on. If you rush the steps the dog “clearly knows” you might miss indications that the dog really doesn't know it as well as you think.

Steve White paraphrases a military phrase by saying “The plan is only valid until first contact with the dog”. Meaning that you can have a well thought out plan, but when you start to work with the dog, you might find that you need to add additional steps, make the starting point easier or that the dog is farther along than you thought.

Example plan:

- ___ 1) Classically condition the scent (dog learns the scent has relevance)
- ___ 2) Get the dog fluent with the indication behavior on cue in multiple environments

- (“Fluent” means the dog responds as soon as you cue, with only the behavior you asked for and maintains it until given another cue or a release)
- ___ 3) Offer the scent to the dog and then cue the indication behavior (sniff – sit)
 - ___ 4) When the dog reliably offers the indication behavior upon presentation of the scent (without needing the original cue for the behavior) you can progress.
 - ___ 5) Move to a new location and repeat steps 3-4
 - ___ 6) Move to a new location and repeat steps 3-4
 - ___ 7) Move to a new location and repeat steps 3-4
 - ___ 8) Move to a new location and repeat steps 3-4
 - ___ 9) Move to a new location and repeat steps 3-4
 - ___ 10) “Hide” the target scent in a way that it is visible to the dog (see it- sniff it- sit)
(If the dog doesn’t do the indication behavior right away, problem solve to find out why)
 - ___ 11) Hide the target odor out of sight but easy for dog to locate (Find it – sniff it – sit)
 - ___ 12) Move to a new location and repeat steps 10-11
 - ___ 13) Move to a new location and repeat steps 10-11
 - ___ 14) Move to a new location and repeat steps 10-11
 - ___ 15) Move to a new location and repeat steps 10-11
 - ___ 16) Move to a new location and repeat steps 10-11

INCREASING DIFFICULTY

Once the dog has a fluent understanding that the target odor is a CUE for a specific behavior, you can start to add some difficulty. There are MANY ways to increase the difficulty (see below). Only change ONE of these factors for ONE part of the chain at a time! Increase difficulty in steps that make it so easy you are pretty sure the dog will succeed. This helps build the dog’s confidence, while improving his skill and keeps the rate of reinforcement high. You should be able to get in several repetitions very quickly because the dog isn’t hesitating or struggling. If you are not sure the dog will get it right, find a way to make the new criteria easier and build difficulty from there.



CRITERIA:

- **Saliency** – this refers to how much something “stands out” from the environment. It can involve changes in:
 - Contrast- using a container that is different from the others in the area would be a visual contrast. Using only identical containers reduces saliency and makes the task harder. Using a scent that is unique in the environment is contrast. Using distraction odors that are similar to the target scent is an example of minimizing contrast to increase the difficulty.
 - Visibility- Is the item visible or hidden, is it daytime or night time? Is the dog wearing black out goggles?
 - Auditory- This can refer to the relevance of auditory assistance (cues/noises the handler makes) or how easy certain sounds are to hear in the environment

- Texture changes- moving to different surfaces, different containers (bag vs. box)
- Scent- is it easy to smell (large concentrations or tiny concentrations)
NOTE: Large or over powering concentrations of scent react differently in the dog's brain than low concentrations. So if the dog is likely to encounter large concentrations (whole body, large container of dope, etc.) then you should train for that. Otherwise, they might not know how to find the source and will indicate on lesser quantities, which might not be anywhere near the source. Conversely, the test will only have small amounts of scent, so if the dog only practices with large amounts, he might not think the small amount is relevant.
- **Vector**- This refers to:
 - Where it is in relation to the dog – in reach, out of reach, above, below, all around (as in a large concentration)
 - What direction is the movement of the scent, movement of the dog in relation to the source (upwind, down wind)
 - Wind direction, currents, pooling of scent (temperature changes and air currents can cause scent to move in odd ways) NOTE: one of the reasons the test uses small quantities of scent is to minimize the effects of air currents on the scent, which could cause it to travel and pool far from the source.
- **Proximity** – how close/far (from dog's starting location, from dog's nose height, etc.)
- **Intensity**– This can be changed in a variety of ways:
 - Volume – can be amount of the source/odor, volume (auditory) of distractions, size of area to be searched, etc.)
 - speed of movement- Is the dog moving fast or slow
 - size- of area to be searched, of container hiding the scent, of the sample
 - volume of scent vs. other scents- if scent is hidden within other strong scent sources like coffee grounds
- **Predictability**–
 - Are you using patterns (either intentionally or unintentionally)
 - Patterns can include things like handler behavior, hiding place use, timing, etc.

Pick one of the items above and think of ways you can add a little bit of difficulty to the dog's task of finding the target odor. At first, it might simply be increasing the size of the area to be searched by a few feet or using a hiding place that is slightly higher or lower than what the dog has been accustomed to so far. Remember to make increases in difficulty that you think the dog can easily handle.

THE HUMAN FACTOR



Try to take yourself out of the search as much as possible. Or you can do the opposite and try to “help” the dog, but always be “wrong”. The dog will learn that the silly human with the little tiny nose has no clue and should be ignored. You want the dog to learn to locate the target odor on his own, not to follow your clues about where it is. If the dog is relying on you, then when you start having another person hide the scent for you (so you don't know where it is) the dog will not

know what to do. He has been relying on subtle signals you didn't even know you were giving and now you have stopped giving the dog the answer. Better to have him learn to do it on his own from the start.

Studies have proven that the handler's actions can and do influence the dog's behavior (well duh!) so you need to be sure the dog is paying attention to what his nose is telling him and not the signals from the human with the poor scenting ability and preconceived notions about where the scent MIGHT be.

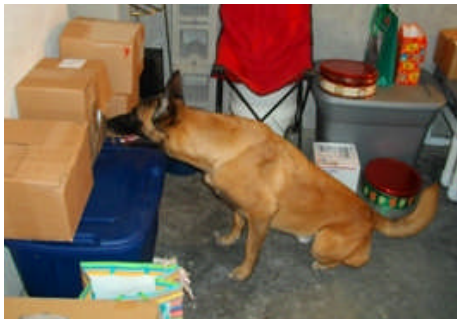
You can do this by giving the search cue and standing completely still (for a room or other contained search). Or you can go over board in your efforts to try to get the dog to look in all the wrong places (allowing him to "accidentally" find it on his own). The less the dog relies on you, the better he will be at searching.

WHEN THINGS GO WRONG

As with any training, there are bound to be bumps along the road. If the dog seems to be struggling, take a break, thank the dog for pointing out a flaw in your training plan, then try to figure out how to fix the gap you created.

But be aware of the "training W". This is where the dog seems to understand, then seems to go brain dead, then shows understanding again, then struggles a bit, and then truly understands it. **THIS IS NORMAL!!**

Sometimes the "dips in understanding" are actually the dog testing the boundaries; trying variations of the behavior to see if they will work or he might be taking a short break to process the information. Stick to your criteria (or lower it a bit) to help the dog understand that the variations are not what you want and the dog will be back on track in no time. Don't assume the dog is lost as soon as you reach the first low point of the W. See if you can help them through it before you scrap the current plan and re-write it. Usually the "testing of the boundaries" only lasts for 1-3 repetitions. But if the dog is consistently getting it incorrect 3+ times in a row, you might need to lower the difficulty.



Four common training pitfalls are:

- Focusing on the problem instead of the solution
- Asking for too much (not breaking things down enough)
- Working for too long in a session
- Being short sighted (Every action has consequences. Be sure what you train today doesn't cause other problems later.)

Steve White has a problem solving formula he calls "DIP-IT"

Define – Isolate – Plan – Implement – Take another look

Define the problem

- “The problem is...”
- Symptoms- What does it look like? What is the dog doing?
- Possible causes (precursors, underlying issues, etc.) What happens right before the dog does the unwanted behavior?

Isolate the problem (how can you break the behavior down or break it out of a chain of other behaviors)

- Work on ONE component at a time for multiple reps:
 - Accuracy
 - Latency
 - Intensity
 - Distance
 - Duration
 - Distraction
 - Timing (of handler)
 - Reinforcer delivery (handler)
- Consider contingencies
 - What happens if...
 - Are there other components that need to be addressed first?
 - Are there foundation behaviors that need to be strengthened?

Plan, plan, plan (put most of your time into the planning/thinking to make training sessions quick/short)

- Training objectives (what do you want to accomplish)
 - Long term goals
 - Current session goals
- Duration of the session or # of repetitions
- Any equipment needed?
- If helpers are involved, be sure they are very clear on their roles

Implement the plan - Do a short training session using the plan

Take another look - check to see where the dog is in his level of understanding

Try to set-up the situation/training so that it is clear to the dog when a rep starts (cue or presentation of something to interact with) and when it has ended (click or a try again cue or clear removal of the opportunity to earn a reward)

- If there is no clear distinction between start/stop, you can't count mistakes vs. correct repetitions. If you don't know the ratio of correct attempts vs. incorrect attempts, you might assume the dog understands something before he actually does.
- A clear re-start after reward delivery allows you to judge speed/latency. The faster the dog does the behavior again, the better is understanding of what behavior is being clicked/rewarded.

GOALS FOR NOVICE LEVEL

You can have your own goals of course, but some suggestions regarding when to know if you are ready for Novice level might be when the dog:

- Goes to work immediately upon hearing the “look for it” cue of your choice
- Carefully checks each container
- Doesn't need help or encouragement from the handler
- Is not easily distracted from the task
- Is able to find small concentrations of the odor
- Is comfortable checking multiple types of containers
- Reliably offers the correct report behavior (of your choice)
- Has worked in several different locations/environments

Good Luck! Hope to see you in a DSA DetectorDog competition soon!