Who is a good boy ? Finding out what makes a performant detection dog

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Dogs are known to be efficient scent detection animals. Their powerful olfactory system and their training ability explain why they are widely used in so many police and military application fields. However, low performance observed in detection dogs (DD) may result from a lack of knowledge on their olfactory neurophysiology and related behaviours (DD) [1,2].

In this work, we associate the results extracted from (1) a deep review of the available literature, (2) an international survey sent to professional DD's handlers (n=50), and (3) an experimental assay performed on cadaver and drug detection dogs (n=20), to decipher what makes a performant DD and ultimately suggest a first definition of what is a high-performance detection dog.

The survey was sent to the police network for law enforcement dog professionals (Kynopol) and detailed answers were received from 50 cadaver detection dog teams. The questions were focused on the procedures of selection, training and performance evaluation. Despite a lack of homogeneity in the selection methods used, selected DDs have usually the same physical and behavioural traits: the agility and the stamina of puppies were highlighted as the most important biological traits to pay attention to during the selection. Playfulness, curiosity and sociability were also regularly pointed out in the answers received. Most surveyed handlers use reinforcement rather than punishment during their training sessions. Although a few teams practice negative reinforcement, the others use either toys, clickers or encouragement as positive stimuli. Practitioners never use commercial training aids and prefer homemade biological aids, that they declare being the most reliable. Both our survey and the literature review suggest that there is no existing definition of what a performant DD is, nor reliable test that could be used to evaluate post training performance. Each team performs its own homemade method that is, in most cases, based on subjective measurements. Most of the surveyed DD teams define a performant DD as a dog which is confident, precise, with high rate of success (low level of false negatives and positives, that is high sensitivity and specificity of the detection) and which perform a strategical research.

Taking these results into account, we set up a behavioural assay to assess detection dogs' performances in hope of validating this definition of a performant DD. Twenty dogs were assessed in a cinderblock half a circle arena (d = 6 m) in which a targeted odour was hidden among other distractive odours. A camera was placed on the ceiling (h=3m) and a video-tracking software was used to analyse the behaviour, movement, and activity of the dog. This arena was validated based on coinertia analysis between measured data in the arena and the dog evaluation by handlers. It allows to measure the dog's error rate and level of strategy.

This study allows for the first time to face practices of professional handlers to scientific knowledge. A first definition of what is a high-performance detection dog is proposed. Finally, an easy-to-replicate method is described to assess detection dogs' performances. Further works should evaluate the impact of the training aids on the resulting DDs' performances.

1 Martin, C., Diederich, C., & Verheggen, C. (2020). Cadaver Dogs and the Deathly Hallows — A Survey and literature review on selection and training procedure. Animals, 10(1219), 1–19.

2 Jezierski, T., Adamkiewicz, E., Walczak, M., Sobczyńska, M., Górecka-Bruzda, A., Ensminger, J., & Papet, E. (2014). Efficacy of drug detection by fully-trained police dogs varies by breed, training level, type of drug and search environment. Forensic Science International, 237, 112–118.