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ADAPTIVE OLFACTORY BEHAVIOUR IN UNTRAINED ADULT DOGS

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Abstract: This study investigated the innate olfactory abilities of untrained adult dogs and their capacity to adapt and learn within a novel experimental setting. Thirty dogs (17 males and 13 females) of various breeds and sizes were individually tested in an unfamiliar, odor-neutral room using a three-box paradigm. In each of three consecutive five-minute trials, one randomly assigned box contained a food reward while the other two were empty. The reward location was randomized between trials, and placement was concealed from both experimenter and subject. Dogs performances were evaluated based on successful identification of the reward, detection latency, and behavioural indicators such as sniffing, exploration, and engagement. Results revealed a significant improvement in performance across trials. The mean detection time decreased from 4.37 minutes in the first trial to 2.53 minutes in the third ($p < 0.05$), and 63% of dogs successfully located the reward in at least two of the three trials. Behavioural observations showed reduced anxiety and avoidance behaviours with repeated exposure, accompanied by increased calm entry, focused sniffing, and efficient search strategies. Although females required slightly more time than males ($p = 0.015$), both sexes demonstrated similar rates of improvement. These findings indicate that even without prior training, dogs can rapidly refine their olfactory search performance through brief, repeated exposure, suggesting strong innate scent-detection capabilities. The observed reduction in latency and shift toward targeted exploration prove the ability to learn and adapt spontaneously in response to environmental feedback. This study emphasizes the plasticity of canine olfactory behaviour and supports the use of short, structured familiarization sessions to assess and develop natural detection potential for applications in public safety, medicine, and behavioural science.

Keywords: Canine behaviour, Olfaction, Scent detection, Behavioural adaptation

• Introduction

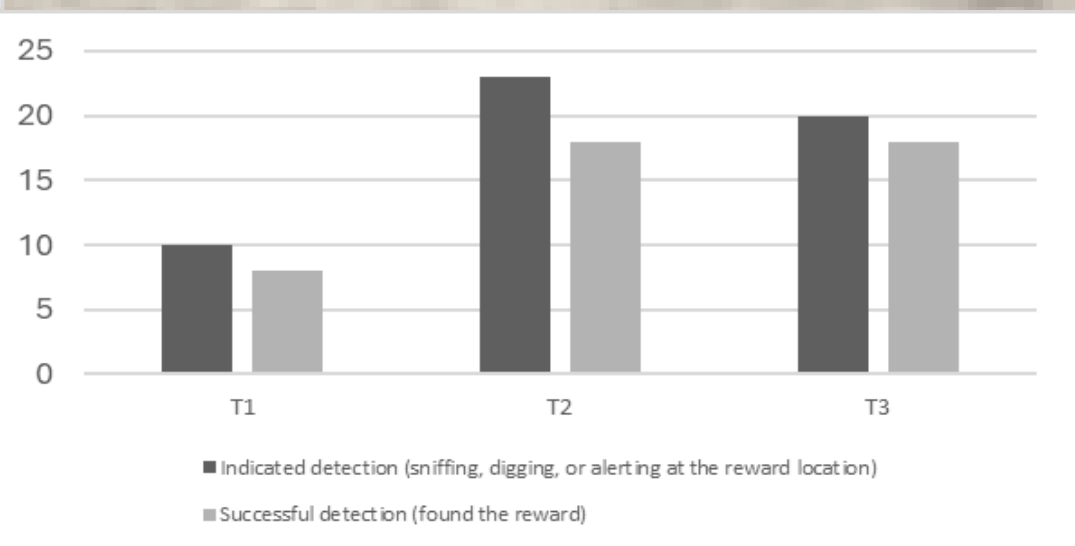
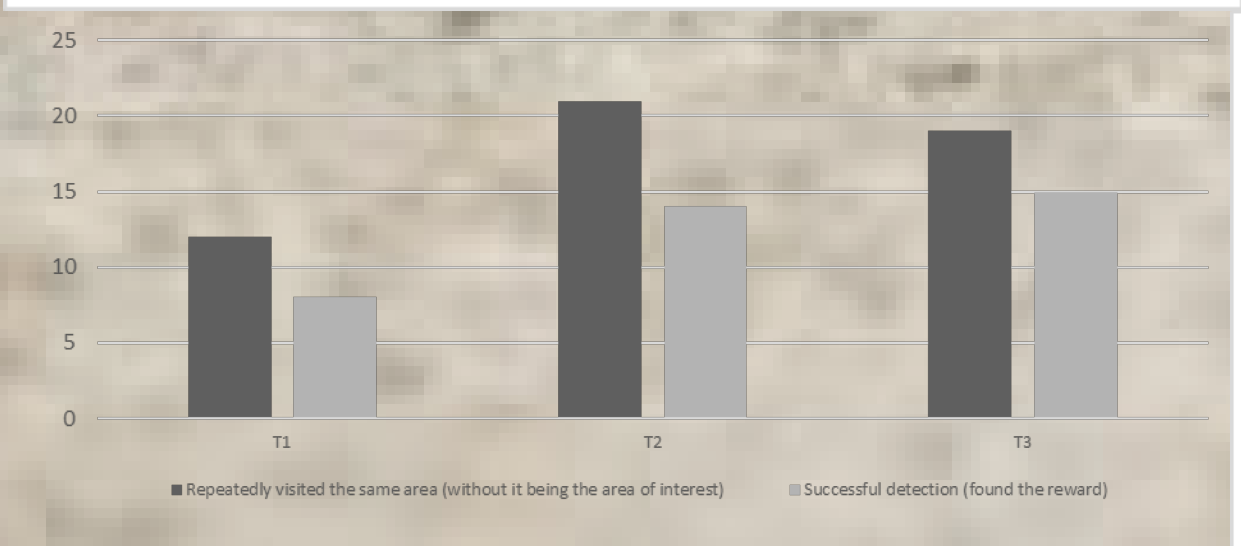
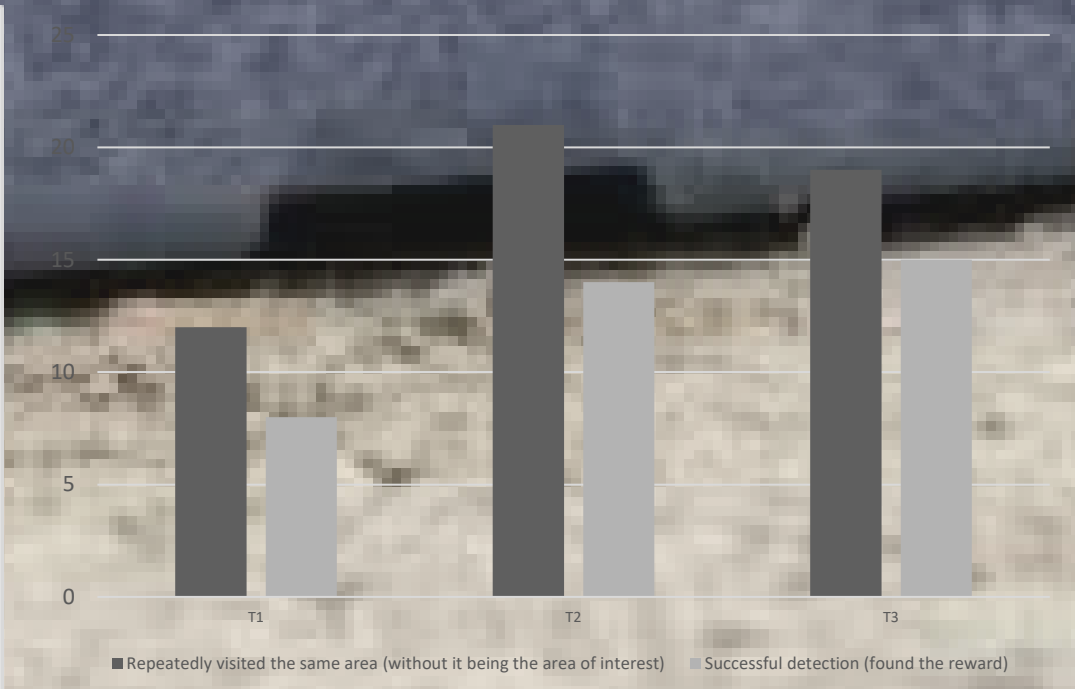
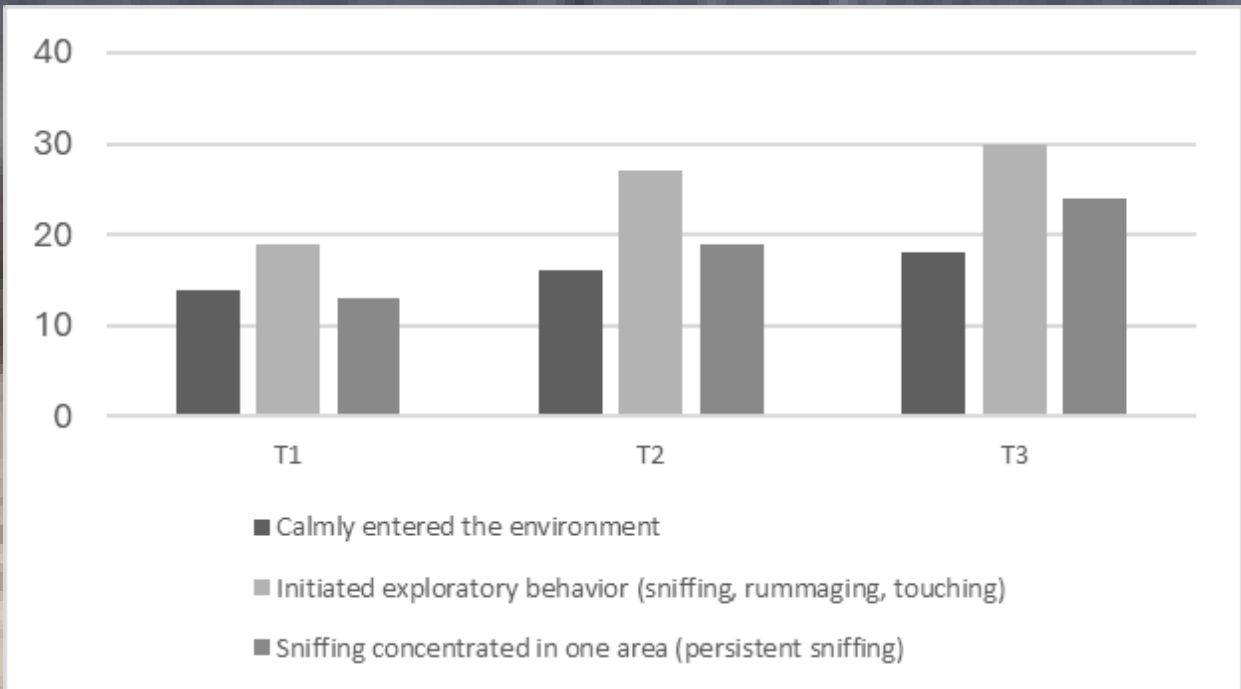
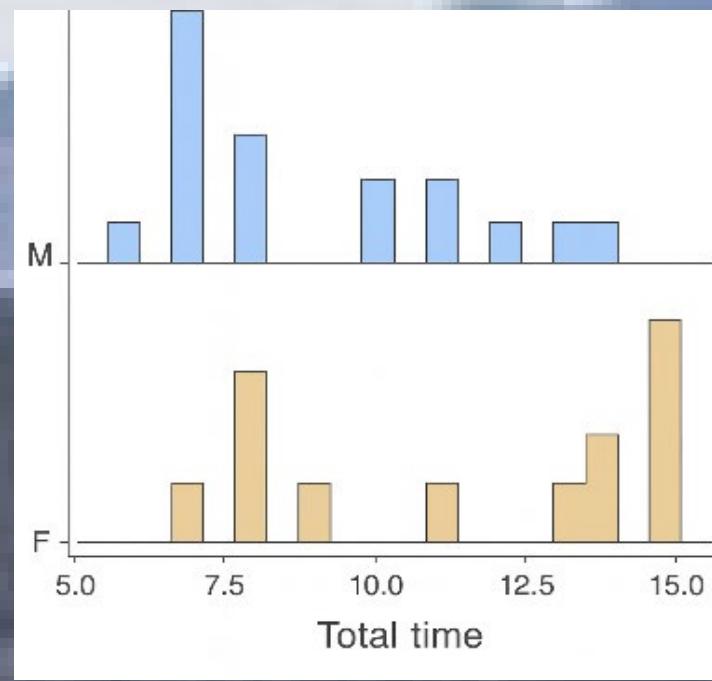
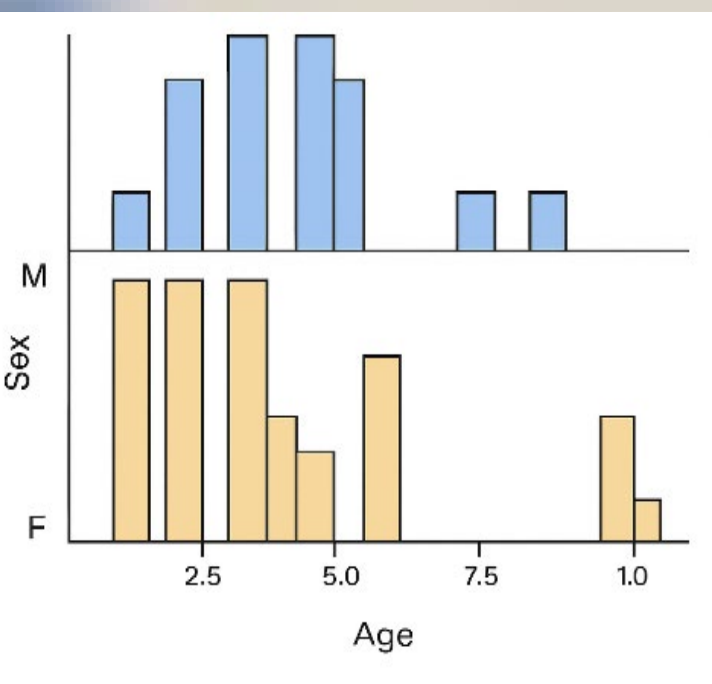
Throughout evolution, dogs have developed a remarkable set of sensory abilities, among which olfaction plays a central role in perceiving and interpreting the environment (Kokocińska-Kusiak, 2021). The canine olfactory system is considered one of the most advanced in the animal kingdom, capable of detecting extremely low concentrations of volatile substances. Its complex structure and direct connections with the central nervous system provide dogs with an exceptional capacity for odor analysis and discrimination, far exceeding human performance (Jendrny, 2021). These physiological characteristics explain why dogs are widely used in activities involving scent detection, from identifying illegal substances (Jezierski, 2014) and missing persons (Woidtke, 2018) to detecting diseases such as cancer (Feil, 2021) or epilepsy (Luff, 2024).

• Material and method

Behavior / Observation	Yes/No Not Observed	Duration / Score
Entered the environment calmly		
Exploratory behavior initiated (sniffing, pawing, touching)		
Extensive sniffing in the environment		
Concentrated sniffing in one area (persistent sniffing)		
Alert or visibly attentive posture (erect ears, focused gaze)		
Visited the same area repeatedly (not necessarily the target area)		
Showed hesitation or pause before searching		
Approached the hidden reward location (within 1 meter)		
Indication detected (sniffing, pawing, or alert at the reward site)		
Successful detection (found the reward)		
Duration of active searching (seconds)		
Latency to first detection indication (seconds)		
Other behaviors		

• Results and discussions

Dog Name	Trial 1	Trial 2	Trial 3
Kiss	Failure	Failure	Success
Daisy	Failure	Failure	Success
Sushi	Failure	Failure	Failure
Rocky	Success	Success	Success
Alfi	Failure	Failure	Success
Molly	Failure	Failure	Success
Coco	Failure	Success	Success
Bailey	Success	Success	Success
Kiro	Success	Success	Success
Lily	Failure	Failure	Failure
Lemon	Success	Success	Success
Oscar	Success	Success	Success
Loki	Success	Success	Success
Nala	Failure	Success	Success
Brokly	Success	Success	Success
Zeus	Failure	Failure	Success
Missy	Success	Success	Success
Lucy	Failure	Failure	Success
Blu	Success	Success	Success
Toby	Failure	Success	Success
Max	Success	Success	Success
Cleo	Failure	Failure	Failure
Bella	Success	Success	Success
Lira	Failure	Failure	Failure
Rex	Success	Success	Success
Tara	Failure	Failure	Success
Luna	Failure	Success	Success
Rex	Success	Success	Success
Charlie	Failure	Success	Success
Pluto	Failure	Success	Failure



• Conclusions

In conclusion, untrained dogs were able to locate the target odor reliably and showed clear performance gains across repeated trials. Detection times decreased and search behavior became more efficient with experience. These results indicate that canine olfactory performance is highly adaptable, and that limited familiarization can effectively engage inherent scent-detection abilities while still reflecting meaningful individual variability.