Evaluation of Two Practical Tools to Assess Cognitive Impairment in Aged Dogs

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Introduction

Cognitive Dysfunction Syndrome (CDS) is an **age-related** neurodegenerative condition in dogs characterized by **changes in behaviour and cognitive abilities (Figure 1).**

The reported **prevalence of CDS** is high, ranging **from 14.2% to 68%**[2,3] and, both the prevalence and severity of symptoms increase with age. **Therefore, there is a need for practical diagnostic tools to allow for early detection.**

Scales developed for the assessment of CDS have improved the accuracy and reliability of diagnosis – but the need for specialist evaluation may limit their practicality. **Allowing pet parents to complete the scale themselves could help enable early detection.**

However, while this scale can be practical for homed dogs, it may not be feasible for other populations of dogs, especially for those **not living in a home environment (NHE)** such as shelter dogs.

Cognitive tests represent a method of **direct evaluation of a dog's cognitive abilities.** However, these test require time to train the dogs to perform them.

Objectives

The present study aimed to describe two practical methods to evaluate cognitive impairment in aged dogs living in different environments:

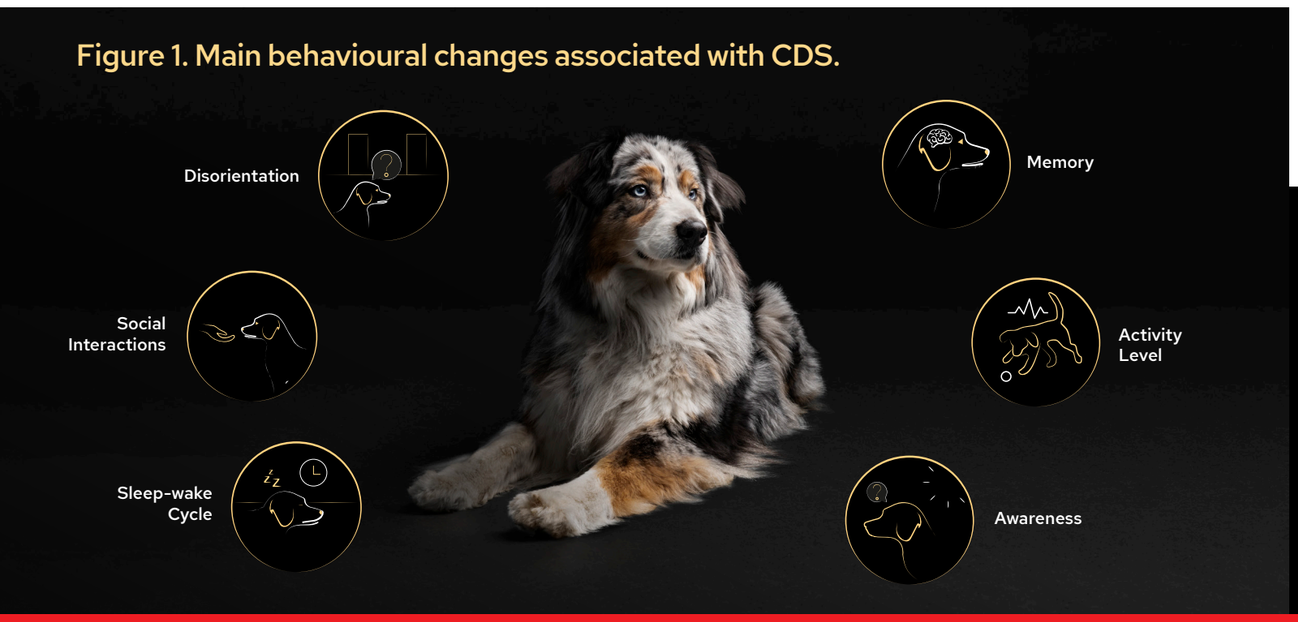
(i) **Canine Cognitive Assessment Scale (CCAS)** for dogs living in a home environment.

(ii) **Practical Cognitive Test (PCT)** for dogs not living in a home environment (NHE).

Secondly, the study aimed to **evaluate the effect of age** on the outcome of both tools and **assess the correlation** between the results of CCAS and the PCT.

Early implementation of management strategies, such as pharmaceutical interventions and nutritional supplementation blends, can help slow the progression and improve the quality of life.

Figure 1. Main behavioural changes associated with CDS.



Study 1: Canine Cognitive Assessment Scale (CCAS)

A total of **100 dogs participated in the study**, with a range of ages from 8 to 18 years old. **Pet parents filled out the CCAS**, providing information about their dog's behavioural changes in the last six months (**Table 1**).

The **frequency of the behaviours was assessed using a 4-point scale**. Based on experts' interpretation and the final score from this scale, dogs were classified as either: Normal Ageing (NA), Mild/Moderate Cognitive Impairment (MCI), or Severe Cognitive Impairment (SCI).

Table 1. Canine Cognitive Assessment Scale (CCAS).

Section 1. Disorientation	1. Stares intently where there is nothing visible. 2. Does not remember its way back home. 3. Becomes stuck behind objects or furniture. 4. Stays on the wrong side of the door. 5. Does not respond to certain stimuli to which it used to respond (for example, doorbell). 6. Does not give any signal when it wants to go out.
Section 2. Social Interaction	7. Does not recognize familiar people. 8. Does not recognize familiar animals. 9. Shows more signs of fear or aggression towards people and/or other dogs than it used to be.
Section 3. Sleep-Wake Cycle	10. Walks during the night (without an obvious reason) when it did not use to do this. 11. Vocalizes (barks, whines) during the night (without an obvious reason), when it did not useto do this.
Section 4. Learning and Memory	12. Urinates and/or defecates in new (inappropriate) places (when it did not use to do it). 13. Finds it difficult to respond to previously learned commands.
Section 5. Activity Level	14. Is less active or playful than it used to be. 15. Shows repetitive behaviours (chases own tail, snaps at "invisible" flies, etc.). 16. Walks without obvious purpose.
Section 6. Anxiety	17. Shows more signs of anxiety when separated from its owners than before (main signs of anxiety are shaking, shivering, or trembling, excessive salivation, restlessness/agitation/pacing, whining and loss of appetite).

Study 2: Practical Cognitive Test (PTC)

A total of **40 dogs participated in the study**, with a range of age from 9 to 16 years old. At the beginning of the study, pet parents had to complete the CCAS.

After this initial assessment, the **PCT** was carried out in a closed room where dogs were assessed performing two tasks for 10 min.

(i) **Discrimination Learning:** dogs had to associate the presence (Positive) or absence (Negative) of food with the specific location (right or left hand of the researcher).

(ii) **Reversal Learning:** identical to the discrimination learning task, except that the P and N were reversed, to measure impaired executive functions.

Results and conclusions

- The CCAS was found to be a practical method for assessing cognitive impairment in owned dogs.
- 25% of dogs evaluated by the CCAS presented a score compatible with CDS. None of these owners had previously reported signs to their veterinarian, probably due to a lack of awareness of this syndrome.
- The PCT was successfully completed by 97.5% of the owned dogs, indicating that this short test could also be a feasible tool to evaluate cognitive states in NHE dogs.
- Age significantly predicted the score obtained by the scale and the outcome of the cognitive test.
- The results from the CCAS were not predicted by the PCT, which calls into question the use of the PCT as a sensitive tool to assess cognitive impairment.

1. Le Brech S, Amat M, Temple D, Manteca X. 2022. Evaluation of Two Practical Tools to Assess Cognitive Impairment in Aged Dogs. Animals 2022, 12, 3538.
2. Neilson, J.C.; Hart, B.L.; Cliff, K.D.; Ruehl, W.W. Prevalence of behavioral changes associated with age-related cognitive impairment in dogs. J. Am. Vet. Med. Assoc. 2001, 218, 1787–1791.
3. Azkona, G.; García-Belenguer, S.; Chacón, G.; Rosado, B.; León, M.; Palacio, J. Prevalence and risk factors of behavioural changes associated with age-related cognitive impairment in geriatricdogs. J. Small Anim. Pract. 2009, 50, 87–91.