Problem solving behavior in dogs: what pet dogs can teach working dogs

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Problem-solving ability I

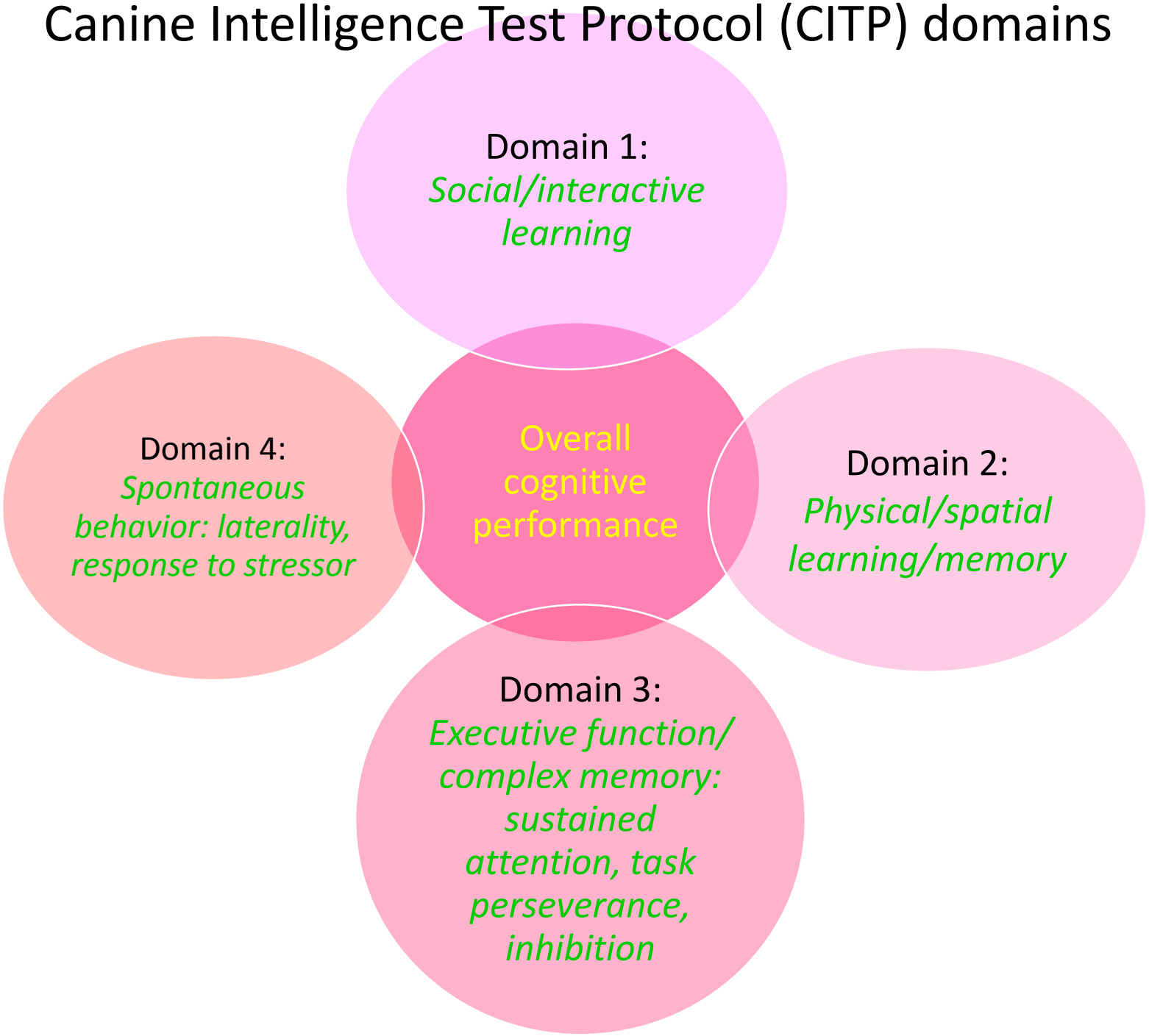
- The task: Assess K-9 problem-solving ability using *techniques different from those used to select and train* working dogs – *develop an objective external referent* - with the ultimate goal of predicting some aspect(s) of training outcome (e.g., success/failure, suitability for specific task type) and any potential genetic associations (WDQ & CITP).

- Subjects: Individual dogs in advanced training for or working using complex behavioral tasks (e.g., detection).

Problem-solving ability II

- Subject pet dogs to the same questionnaire (WDQ-PET) and test (CITP) to determine range of canine responses for comparison with working dogs
- Enhance test complexity (2 ball puzzle box test)
- Include test-retest
- Include ontogenic component

Canine Intelligence Test Protocol (CITP) domains



Domains CITP

↓	1	2	3	4	5	6	7	8	9	10	11	12	13
1	X	X	X	X		X	X		X	X			
2							X	X	X	X	X	X	
3					X	X	X	X	X	X	X	X	
4					X	X	X	X	X	X	X	X	X

*Canine Intelligence Test Protocol/CITP: Data collected during timed tests: latency to start, time to completion, succeed/fail, order effects, specific behaviors observed.

Tests 1 and 2 (Domain 1) Test for attentiveness and referential focus

1. Attentiveness: Combined vocal and facial signals

2. Attentiveness: Vocal signal, only

Tests 3 (stranger) and 4 (handler) (Domain 1) Test for attentiveness and referential/attentional focus (ability to continuously attend and follow)

Test 5 (Domains 3 & 4) Test for response to novelty (open field)

Test 6 (Domains 1, 3 & 4) Interest, attentiveness, training run

Test 7 (Domains 1-4) Interest, attentiveness, training run for choice

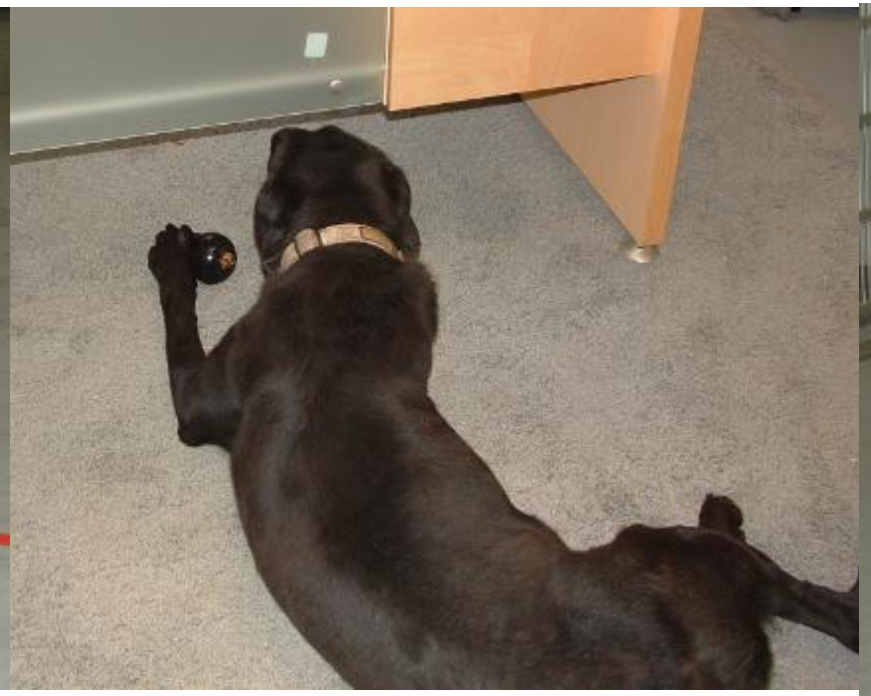
Tests 8 & 9* (Domains 1-4) Showing and social cognition (*knocking v. pointing determined randomly each dog)

Test 10 (Domains 2, 3 &4) Attentiveness and landmarks

Test 11 (Domains 2, 3 & 4) The puzzle box test: ‘boldness’, tenacity, impulsivity, problem solving style

Test 12 (Domains 2, 3 &4) Detour test

Test 13 (Domain 4) Handedness assessment (combined with noise reactivity test)



Consider the data from 2 tests: landmarks (10) and the puzzle box (11)

- In test 10 (landmarks) WD were faster but just checked all the boxes; pet dogs more often used the cue and directed focus. Pet dogs made fewer errors in using the landmark to identify the box to choose.

- In test 11 (puzzle box) 73% of the WD completed the task in the allocated time but 91% of pet dogs did. The range for time to completion was the same (3-300 seconds). When successful, the WD accomplished the task in ¾ of the time it took a pet dog.

- In both WD and pet dogs reactivity interfered with accurate completion of the task, regardless of the speed with which tasks were accomplished for those who accomplished them.

From the audiology study:

- 5 of the final 17 noise reactive dogs were too reactive to undergo or complete the test but ***none*** of the final 14 non-reactive dogs were unable to undergo and complete testing (G test; $P<0.0294$).

- *The noise reactive dogs different significantly from non-reactive dogs in handling and testing ability.*

Do good problem solvers differ from poor problem solvers in how they move?

General findings to date are:

- When individual steps are counted for detection dogs who are successful at the puzzle box test, there is a clear difference between quick solver group, and an expanded group (> ¼ of the dogs) who never solve the task.
- Dogs who solve the task accurately & quickly –whether they are pet or working dogs - take fewer steps, identify a strategy, learn from their first action, and retrieve the ball quickly. They can get faster.
- Detections dogs who solve the task slowly or who do not solve it (both flag/landmark test and puzzle box), do not identify a strategy and instead are stimulated by the situation, take many steps, and do not get the ball. Many of them exhibit behaviors commonly associated with agitation, frustration and anxiety.
- The detection dogs differ from the pet dogs in interesting ways, mostly related to speed and intensity of force (no pet dogs threw the box but one shoved and upended it), but the patterns clearly elucidated and dissected for the pet dogs can inform selection of working dogs.
- Pet dogs with an anxiety disorder (noise reactivity) took more steps for any action, moved with starts and stops, used their activity inefficiently and did not solve the problems well. Reactive working dogs did the same, and it's likely these dogs have the same problems processing information that anxious pet dogs do. ***When we select for working dogs, we may be confounding reactivity with intention to work, and this may have far-reaching implications for welfare, the development of C-PTSD, trainability, efficacy of work, and working life.***

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