

On the trail of the clever snail: Animals, like humans, excel at some tasks but not others

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Pond snails used in the experiment, *Lymnaea stagnalis*, have been used for over 25 years to study learning and memory. Credit: Sarah Dalesman

Animals, like humans, excel at some tasks but not others according to a new study published in the journal *Scientific Reports*.

Researchers from the Universities of Exeter and Aberystwyth used pond [snails](#) to investigate learning and [memory](#). They found that if an individual is good at forming memories about food they are poor at forming memories related to predator threat and vice versa.

Dr Sasha Dall from the Centre for Ecology and Conservation at the University of Exeter's Penryn Campus in Cornwall said: "We found that snails vary in their ability to remember and respond to training. Those that had aptitudes for memory formation under one condition were less able to form memories in other conditions. There is no such thing as a universally smart snail."

Dr Sarah Dalesman, Leverhulme Trust Early Career Fellow from Aberystwyth University, said: "It's widely assumed that there are intelligent individuals in all species, but this has been very difficult to demonstrate. Our research suggests that rather than 'smart' and 'dumb' animals, all individuals are smart at some things but not everything. This is not really surprising if we think of things our friends are good at. Not everyone I know is good at everything, but everyone I know has some things they are very good at.

"Demonstrating general intelligence in wild animals has so far proved elusive, but our research has revealed why this may be. We tested memory ability in individual [pond snails](#) across a range of tasks including memory of what is good or bad to eat, and predator avoidance. This revealed that individuals who are good at one type of memory are generally very poor at other types of memory."



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To test the snails' memory, certain behaviours were encouraged or discouraged, and their ability to remember was assessed by whether their behaviour had changed in response to the training.

The snails were trained in three different ways. Firstly, they were taught to associate food taste, in this case carrot, with a bad chemical taste. Secondly they associated a neutral smell, for snails this is the smell of pear drops, with a good food taste and thirdly they were taught to associate trying to breathe at the water surface with being poked - considered by snails to be a predator threat.

Snails that were good at one type of food memory were also good at the other type of food memory. If they were good at forming food memories, however, they were very bad at remembering about predator threat.

Dr Dall added: "What was very striking was the consistency in the relationship between different memories across different populations. We tested eight different populations and they all showed the same pattern irrespective of the type of habitat they came from."

The pond snails used in the experiment, *Lymnaea stagnalis*, have been used for over 25 years to study learning and memory. They make an ideal model organism as they have been used in similar previous studies so have well-characterised memory traits, as well as it being easy to access populations of snails from different habitats.

The habitats that the snails originated from did not affect which traits they had good memory capabilities for. It was expected that snails from laboratory populations, with easy access to food and no predators, would not form memories as well due to a reduced need to respond to threats in their environment. Whereas populations from rivers or ditches would form memories more easily as it would be advantageous for them to

remember threats so they can avoid them. However, the study found no relationship between the habitats snails were from and the training they responded well to.

Provided by University of Exeter

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