

MOVEMENT PATTERNS AND FORAGING OF BANK VOLES IN A  
NETWORK OF Y-JUNCTIONS IN PRESENCE  
OF PREDATOR ODOURS

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We tested in a regular-hexagon maze the influence of predator odours on the utilisation of routes initially preferred for foraging. The ordered maze contained only bifurcations of three ways (as natural networks) and two central food sources hidden from the external nest. We studied for five days movement patterns and food consumption of a male and a female bank vole (*Clethrionomys glareolus*). During a 3-day control phase, one source was marked by sheep faeces while the other was not marked. On day 3, cat faeces were added to one of the sources (in 50% to the one with sheep odours).

We first predicted that sheep odours should not influence the vole foraging routes. So both food sources would be visited and exploited in the same proportions. A second hypothesis predicted that isolated voles with no predator odours would quickly use some of the shortest routes going directly from the nest to the food sources rather than following the periphery of the maze. Finally, the predator-defence mechanisms predict that the addition of cat odours should lead to the avoidance or at least the under-exploitation of the predator-marked food source.

We used 18 adult wild voles captured in Belgium (nine males and nine females). The movements of an isolated vole inside the maze were observed 14 hours a day under light conditions with a video tracking software (Ethovision 3.1, Noldus).

Contrary to our first hypothesis, sheep odours were not completely neutral. During the exploration on day 0, females visited the sheep-odour food zone longer than the no-odour food zone while males showed the contrary relationship. After the initial exploration of all zones on day 0, animals quickly used the direct routes to go to both food sources, as our second hypothesis predicted. These results will be further discussed.

Contrary to our third hypothesis, the voles did not change their food consumption in presence of cat odours. They still consumed comparable quantities of food from each source and did not diminish the total quantity foraged. However, during their movements on day 4 the voles maintained a bigger distance between them and the cat odour than between them and the other food zone. These two last results show that the cat odours do not prevent the voles from exploiting resources but they make them decrease the potential risk by adapting their behaviour. Finally, in presence of cat odours the females visited the sheep or no odour source before the cat odour source.

The use of direct routes to the food highlights the spatial ability of bank voles, which were able to assess the general direction to the food from their nest. This observation can imply that the voles scent-marked the shortest foraging routes, or that they used distant visual or auditory cues as orientation mechanism. This second possibility is supported.

The influence of predator odours seems stronger on females than on males. This sexual difference can be partly explained by the bigger female vulnerability to predators due to their lower mobility and easier detection when pregnant or lactating.

As a main conclusion, predator odours had a repulsive effect on bank voles. However, this did not significantly diminish the total quantity foraged. The fine analysis of spatial patterns will be further discussed and will help to understand the mechanisms involved in such predator cue avoidance and in spatial orientation mechanisms of this small rodent. This study showed that voles confronted to predator cues precisely adapt their behaviour without compromising their resource exploitation.