

Badger Behaviour Across Human Landscapes

Using Wildlife Cameras and Artificial Intelligence



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AIM OF STUDY



Background: Behavioral response and adaptations in animals across human disturbed environments.

The project compared the behaviour of badgers (*Meles meles*) between an undisturbed island habitat and a human-impacted mainland habitat.

STUDY SITE

Two distinct habitats in Denmark: The undisturbed island of Vorskø and a highly human-impacted mainland of Jutland.



Figure 1. The figure indicates the areas where camera traps were placed at badger setts and along trails in Jutland, Denmark. Black triangles denote trail locations, while black squares denote sett locations. The red circle indicates the location of the inset map of Vorskø.

RESULTS

Behavioral time budgets of island and mainland populations.

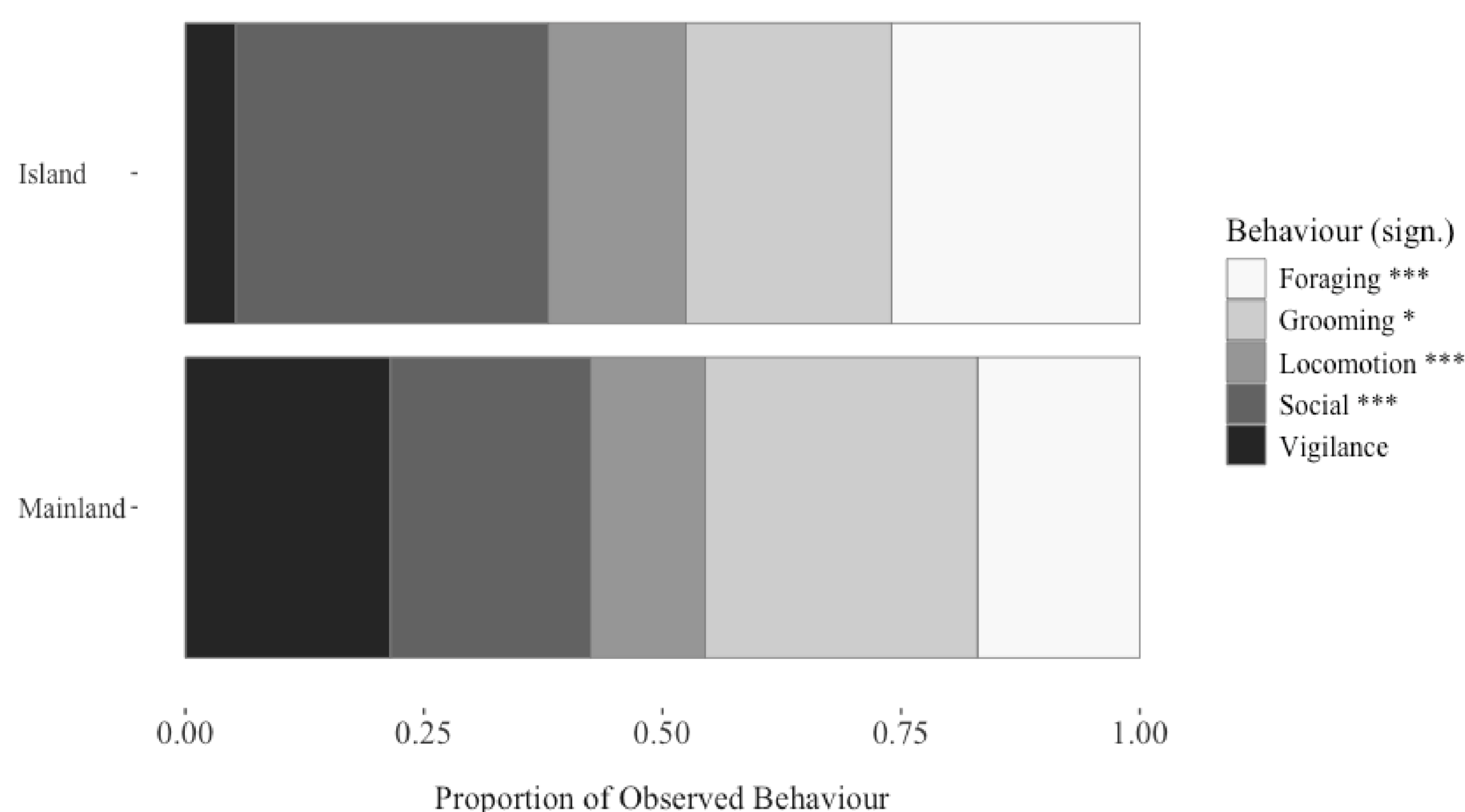


Figure 4. A stacked bar plot shows the proportional time allocation to five observed behaviours (Foraging, Grooming, Locomotion, Social, and Vigilance), for individuals from mainland and island populations. Bars represent the summed durations of individual behaviour bouts per area, expressed as proportions of the total observed time (Mainland = 1156 seconds; Island = 1854 seconds). Behaviour labels in the legend are marked with significance asterisks from Mann-Whitney U tests comparing the two areas (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$). The y-axis indicates area, while the x-axis represents the proportion of observed behaviour.

METHODS (Machine Learning Analysis)



Figure 2. Badger behaviour on the mainland and island was quantified using LabGym (v2.5), a machine-learning tool for automated behavioural classification. Five predefined behaviours were classified: Foraging, Grooming, Locomotion, Vigilance, and Social behaviour, for approximately 2,000 videos. LabGym generated confidence scored classifications and exported timestamps, counts, and durations for each behaviour for later statistical analysis. The figure illustrates an example of LabGym categorising the behaviour Vigilance with 99% accuracy.

CONCLUSIONS

This study revealed:

- 1) Clear behavioural differences between island and mainland badgers, shaped by varying levels of human disturbance.
- 2) Island individuals showed more continuous activity and greater variation in Locomotion, while mainland individuals displayed more variable Social behaviour and heightened Vigilance.
- 3) These findings emphasise the importance of behavioural plasticity and context-dependent responses in disturbed environments. As badgers are ecosystem engineers, preserving behavioural diversity may support broader ecological communities and should be considered in conservation strategies.

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