

Experimental evidence of memory-based foraging decisions in a large wild mammal

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Many animals restrict their movements to a characteristic home range. This constrained pattern of space use is thought to result from the foraging benefits of memorizing the locations and quality of heterogeneously distributed resources. However, due to the confounding effects of sensory perception, the role of memory in home-range movement behavior lacks definitive evidence in the wild. Here, we analyze the foraging decisions of a large mammal during a field resource manipulation experiment designed to disentangle the effects of memory and perception. We parametrize a mechanistic model of spatial transitions using experimental data to quantify the cognitive processes underlying animal foraging behavior and to predict how individuals respond to resource heterogeneity in space and time. We demonstrate that roe deer (*Capreolus capreolus*) rely on memory, not perception, to track the spatiotemporal dynamics of resources within their home range. Roe deer foraging decisions were primarily based on recent experience (half-lives of 0.9 and 5.6 d for attribute and spatial memory, respectively), enabling them to adapt to sudden changes in resource availability. The proposed memory-based model was able to both quantify the cognitive processes underlying roe deer behavior and accurately predict how they shifted resource use during the experiment. Our study highlights the fact that animal foraging decisions are based on incomplete information on the locations of available resources, a factor that is critical to developing accurate predictions of animal spatial behavior but is typically not accounted for in analyses of animal movement in the wild.

Abstract



- Stand-alone summary/overview
- 200-300 words
- Components:
 - 1. Background, known
 - 2. Gap, unknown, problem
 - 3. Research aim / hypothesis
 - 4. Quick summary of approach / methods
 - 5. Key results, important numbers
 - 6. Conclusion / answer the question
 - 7. Broader implication/speculation/recommendation

Alison M.

Ashbury,

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Introduction

What does my audience need to know in order to understand, and care about, my study?