Does personality expressed by roe deer during an acute stress explain their movement syndrome in the wild or their phenotypic plasticity in movement, space use and activity?

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Résumé

When faced with stressful situations, individuals vary in their behavioural and physiological responses depending on their behavioural type. For mobile species, movement is often the first tool to deal with challenging conditions. In addition to exhibiting distinct movement syndromes, suites of correlated consistent movement traits, individuals may differ in their plasticity in space use, activity and movement, meaning they adjust their behaviour to changing conditions. These among-individual differences in personality and plasticity have been identified in various taxa, and are associated to differences in risk taking, resource acquisition and performance. Standardised tests have been used to identify behavioural types and evaluate plasticity in a variety of traits, like docility, boldness and exploration. However, behaviours evaluated in controlled settings might not accurately represent personality and plasticity expressed in the wild. Based on a long-term monitored roe deer (*Capreolus capreolus*) population, we investigated the existence of a movement syndrome linking activity, space use and spatial behaviour, quantified through six repeatable movement metrics computed monthly. We studied the correlation between stress response traits evaluated during capture, i.e. docility and physiological parameters (neutrophil to lymphocyte ratio, haematocrit level and rectal temperature), and routine movement and space use patterns. Using Bayesian multivariate mixed models, we unravelled the existence of a movement syndrome in roe deer, with individuals using risky open habitats more during daytime being less active and having a higher average speed of movement, as well as bigger home ranges. This movement syndrome highlights the existence of separate and consistent movement tactics, which can have consequences on population persistence, individual survival and reproductive success. We found no association between stress response and movement syndrome, suggesting that, in roe deer, behavioural types measured during the standardised setting of capture does not inform on the movement-based personality traits in the wild. Furthermore, in the second part of this study we will investigate the link between stress response and plasticity in movement metrics, which could represent differences of individual adaptability to stressful situations in roe deer. Based on studies in various taxa, we expect individuals showing a stronger behavioural and physiological stress response to capture event to be more routine-forming and less plastic. The existence of plasticity in movement metrics could be linked to individual differences in the risk avoidance – resource acquisition trade-off, in turn influencing their survival and performance in diverging habitats.

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Mots-Clés: behavioural syndrome, stress response, movement ecology, GPS, wild roe deer, spatial behavior