

Abstract:

The symmetry of spatial layouts belongs to the category of geometric cues - that are based on relative, abstract, relationships of objects rather than their exact characteristics. Investigating the phenomena associated with the geometric aspects of insect navigation, holds relevance to the debate on the ability of insects to form and use internalized representations of phenomena and objects. The aim of this dissertation was to investigate the ability of the domestic cricket (*Acheta domesticus*) to perceive and use geometric features of the environment in navigational behaviour. The research that was covered in this dissertation was focused on the use of environmental symmetry as a cue to find a target in a navigation task. For the purpose of the thesis, a research paradigm allowing the systematic study of navigational behaviour using geometric cues (aiming to reduce the interference of potential non-geometric navigation mechanisms to the greatest extent possible) in individuals of the species used was implemented and evaluated. The characterisation of spontaneous locomotor activity within spatial environments differing in the degree of symmetry was conducted, and then the ability of *A. domesticus* to use information about the symmetry of the environment as a cue in learning to solve a navigation task was examined. Based on the results, a conclusion was drawn about the significance of environmental symmetry as a facilitating factor in the speed and efficiency of learning to find a target. The navigational strategies used by the studied insects in the conducted tests were identified and characterised. To further extend the analysis of the phenomena studied in the context of the ability to generalise stimuli, the effectiveness of learning to solve a navigation task was investigated in variants differing in access to sensory information as well as to perform crossmodal knowledge transfer between these variants. The results obtained indicate that memory of the spatial layout of the environment, with respect to symmetric arenas, is likely to possess an crossmodal character.

Keywords: navigation, geometry, spatial cognition, spatial memory, house cricket, *Acheta domesticus*