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Studying exploratory behaviour and anxiety

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The assessment of exploratory and anxiety-like behaviors is an important aspect of the behavioral investigation of genetically modified mice. Depending on the mouse model, this may be the main focus of the study. But even if a mutant was generated with a primary interest in learning and memory, careful phenotyping must include the examination of exploratory and anxiety-like behaviors because alterations of emotional behavior can interfere with learning.

Commonly used procedures assess behavior in a conflict between the innate tendency to explore novel environments or objects and the natural avoidance of potentially dangerous situations such as lit open space or cliffs. The tests differ with respect to the overall aversiveness of the situation and use different kinds of aversive stimuli. The open-field test, light/dark box, elevated O- or plus-maze force the animal into a confrontation with an entirely unknown arena, parts of which may be more frightening than others, however. A second category of tests such as the emergence, free exploration, or novel object tests provide the animals with a safe, familiar place to retreat, leaving them a free choice whether to explore novel stimuli or not. These two test categories have been proposed to differentiate between ‘state’ and ‘trait’ anxiety, that is anxiety that the subject experiences at a particular moment of time in the presence of an anxiogenic stimulus, and anxiety that does not vary from moment to moment and is considered to be an enduring feature of an individual. Alternative models create conflicts between aversive stimuli and drinking or food intake, simulate the presence of a predator, or assess conditioned fear responses.