Appetitively motivated tasks in the IntelliCage reveal higher motivational cost of spatial learning in male than female mice.

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The IntelliCage (IC) permits assessment of behavior and learning of mice in a social home cage context. In order to overcome water deprivation as aversive driver of learning, we developed protocols in which spatial learning is motivated appetitively by the preference of mice for sweetened over plain water. While plain water is available at all times, only correct task responses give access to sweetened water reward. Under these conditions, C57BL/6 mice successfully master a corner preference task with reversal and also learn a more difficult time-place task with reversal. However, the rate of responding for sweetened water decreases strongly with increasing task difficulty, indicating that learning challenge and reduced success in obtaining reward decrease the motivation of the animals to seek sweetened water. While C57BL/6 mice of both sexes learned similarly well in this suite of tasks and showed similar initial taste preference, the rate of responding for sweetened water dropped much more strongly in male than in female mice in response to the learning challenge. This suggests that the challenge of learning has a higher motivational cost in male than in female mice.