**Method description SVM classification algorithm of MWM tracks:**

We trained a multi-class support vector machine ([SVM; see Cortes & Vapnik, 1995](#_ENREF_3)) model that was using 809 tracks scored by one human observer (based on static track images). We followed the classification scheme into 9 classes proposed by [Brody and Holtzman (2006](#_ENREF_2)). For each track in the dataset, we extracted 17 parameters based on a scan of the literature ([Bovet & Benhamou, 1988](#_ENREF_1); [Gallagher, Burwell, & Burchinal, 1993](#_ENREF_4); [Garthe, Behr, & Kempermann, 2009](#_ENREF_5); [Wolfer, Madani, Valenti, & Lipp, 2001](#_ENREF_7)) based on time-tagged x-y coordinates exported from Ethovision (Noldus, recorded at 5Hz sampling rate). The model was trained using 80% randomly selected tracks. 36 one-against-one SVMs ([Weston & Watkins, 1998](#_ENREF_6)) with linear kernel were trained for each pair-wise comparison of classes. The resulting model was tested on the remaining 20% of tracks using a voting scheme (max wins voting). The track was assigned to the class that received the most votes (in case of a tie, we selected the first category with maximal number of votes). We obtained model performance of 71% (cf. chance level of 11.1%) classification for all unseen tracks and the mean rank of the correct class was 1.46 (out of 9). Subsequently, we trained the model using all 809 tracks (which could possibly yield a higher performance as the model is trained on more trials) and tested all tracks recorded for the current experiment. To obtain percentages spatial/non-spatial/repetitive strategies, we summed over respectively classes 1-3, 4-6 and 7-9 of the Brody *et al.* classification scheme.

**References**

Bovet, P., & Benhamou, S. (1988). Spatial-Analysis of Animals Movements Using a Correlated Random-Walk Model. *Journal of Theoretical Biology, 131*(4), 419-33

Brody, D. L., & Holtzman, D. M. (2006). Morris water maze search strategy analysis in PDAPP mice before and after experimental traumatic brain injury. *Experimental Neurology, 197*(2), 330-40

Cortes, C., & Vapnik, V. (1995). Support-Vector Networks. *Machine Learning, 20*(3), 273-97

Gallagher, M., Burwell, R. D., & Burchinal, M. (1993). Severity of Spatial-Learning Impairment in Aging - Development of a Learning Index for Performance in the Morris Water Maze. *Behavioral Neuroscience, 107*(4), 618-26

Garthe, A., Behr, J., & Kempermann, G. (2009). Adult-Generated Hippocampal Neurons Allow the Flexible Use of Spatially Precise Learning Strategies. *PLoS One, 4*(5)

Weston, J., & Watkins, C. (1998). Multi-class support vector machins. *Technical Report CSD-TR-98-04*. Egham, Surrey, UK: Department of Computer Science, Royal Holloway, University of London.

Wolfer, D. P., Madani, R., Valenti, P., & Lipp, H. P. (2001). Extended analysis of path data from mutant mice using the public domain software Wintrack. *Physiology & Behavior, 73*(5), 745-53

Appendix A: List of parameters extracted from each track

1. pathlength :
2. latency
3. velocity
4. cumSearchError
5. absHeadingError
6. meanDistCentroid
7. meanDistTarget
8. meanDistPoolCenter
9. timeInTargetCorridor
10. timeInTargetZone
11. timeInOuterWallZone
12. timeInCloserWallZone
13. timeInTargetAnnulus
14. timeInCenterZone
15. turningAmount
16. stdHeading
17. sinuosity