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References
1. Katz, O., Pinkas, M., Akerman, N. & Ozeri, R. *Nat. Phys.* https://doi.org/10.1038/s41567-022-01517-y (2022).
2. Grier, A. T., Cetina, M., Orucevic, F. & Vuletic, V. *Phys. Rev. Lett.* **102**, 223201 (2009).
3. Zipkes, C., Palzer, S., Sias, C. & Kohl, M. *Nature* **464**, 388–391 (2010).
4. Cetina, M., Grier, A. T. & Vuletic, V. *Phys. Rev. Lett.* **109**, 253201 (2012).
5. Feldker, T. et al. *Nat. Phys.* **16**, 413–416 (2020).
6. Weckesser, P. et al. *Nature* **600**, 429–433 (2021).
7. Schmidt, P. O. et al. *Science* **309**, 749–752 (2005).
8. Wolf, F. et al. *Nature* **530**, 457–460 (2016).
9. Sikorsky, T. et al. *Phys. Rev. Lett.* **121**, 173402 (2018).
10. Kaufman, A. M. & Ni, K.-K. *Nat. Phys.* **17**, 1324–1333 (2021).

Competing interests
The author declares no competing interests.

STATISTICAL PHYSICS

Return of the bats

When humans move through known areas they rely on their existing knowledge of the space around them to choose their route. Recent analyses of foraging data suggest that certain animals also rely on their memory when they search for food. Bats, for example, return to the same food source in a manner reminiscent of a reinforcement learning strategy rather than following a purely random search. Mobility models should therefore include an animal's ability to use information of previous visits when deciding which route to follow. Ohad Vilk and colleagues have now shown that a model incorporating memory of previously visited locations can describe the movements of wild fruit bats (*Phys. Rev. Lett.* **128**, 148301; 2022).

A version of this model was previously used to investigate human mobility and considers both exploration of new locations and preferential returns, that is, the tendency of an individual to return to previously visited sites. Vilk and colleagues generalized the model to include variability in the bat population and considered a nonlinear variation of the likelihood of return visits as the number of visits to a particular site increased. As the nonlinear parameter representing the tendency to return was varied, the team observed a phase transition in the dynamics of foragers. Above a critical value of the parameter, the animals revisited the same sites many times, but below the critical value there were almost no returns.

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Vilk and colleagues compared their model predictions with data of wild Egyptian fruit bat (pictured) movements. They found that the bats were less adventurous in summer, visiting fewer new locations than in winter. The summertime abundance of fruit likely lowered the motivation for risky journeys to search for new fruit trees. Overall, the bat mobility data appeared to fit the model at the critical value of the preferential returns parameter. This suggests that bats choose to balance adventures to unknown locations with returns to known sources of food.

Including memory in mathematical models is a challenge and models such as the one by Vilk and colleagues might be useful for other time-dependent problems where decisions are based on past situations, for example human migration or mobility following COVID-19 lockdowns. ❐

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