

Abstract Submitted
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How do mice follow odor trails? DAVID ZWICKER, Harvard University, SOPHIE TRASTOUR, Ecole Polytechnique and Harvard University, SHRUTI MISHRA, ALEXANDER MATHIS, VENKATESH MURTHY, MICHAEL P. BRENNER, Harvard University — Mice are excellent at following odor trails e.g. to locate food or to find mates. However, it is not yet understood what navigation strategies they use. In principle, they could either evaluate temporal differences between sniffs or they could use concurrent input from the two nostrils. It is unknown to what extent these two strategies contribute to mice performance. When mice follow trails, odors evaporate from the ground, are transported by flow in the air, and are then inhaled with the two nostrils. In order to differentiate between the two navigation strategies, we determine what information the mouse receives: first, we calculate the airflow by numerically solving the incompressible Navier-Stokes equations. We then determine the spatiotemporal odor concentration from the resulting advection-diffusion equations. Lastly, we determine the odor amount in each nostril by calculating the inhalation volumes using potential flow theory. Taken together, we determine the odor amount in each nostril during each sniff, allowing a detailed study of navigation strategies.

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