Title:	Extension and dynamical phases in random walkers depositing and following chemical trails
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Abstract:	Active walker models have proved to be extremely effective in understanding the evolution of a large class of systems in biology like ant trail formation and pedestrian trails. We propose a simple model of a random walker which modifies its local environment that in turn influences the motion of the walker at a later time. We perform direct numerical simulations of the walker in a discrete lattice with the walker actively depositing a chemical which attracts the walker trajectory and also evaporates in time. We propose a method to look at the structural transitions of the trajectory using radius of gyration for finite time walks. The extension over a definite time window shows a non-monotonic change with the deposition rate characteristic of a coil-globule transition. At certain regions of the parameter space of the chemical deposition and evaporation rates, the extensions of the walker shows a re-entrant behavior. The dynamics, characterised by the mean-squared displacement, shows deviation from diffusive scaling at intermediate time scales, returning to diffusive behavior asymptotically. A mean-field theory captures the variation of the asymptotic diffusivity.
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