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On the relationship between fractal dimension and encounters

in three-dimensional trajectories

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The encounter of individuals – prey, predators and mates – living in the surrounding environment is a fundamental process in the life of an organism. Along with the sensory abilities, this process will be regulated by the movement rules adopted by the individual. In this work we discuss on the encounter enhancement effect due to different natatorial modes by calculating the number of encounters realised by differently convoluted trajectories in two homogenous distributions of particles. Using numerically-generated trajectories representative of specific swimming behaviour, we demonstrate that an excess convolutedness is beneficial only at high concentration, whereas at low concentration less tortuous tracks are almost equally efficient. In the light of our results it is possible to better understand the behavioural adaptations evolved by individuals to thrive in their environment.