Multiple object tracking doesn't care if you are crossing the street or bouncing off the walls

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In our dynamic world, it is important to be able to track items over space and time. The multiple object tracking task has been used to investigate the ability to sustain attention on multiple identical items undergoing random motion. Our abilities in such tasks are very limited. When tracking has been studied in the lab, performance declines rapidly if you track more than three or four objects. Typically, motion tracking displays have used random motion with, perhaps, some rules of physics governing collisions. In the real world, however, we are likely to be more interested in tracking items that are subject to effects of crowding and social factors such as "personal space". Might our tracking capacity be greater for stimuli closer to what we need to track? We created motion tracking displays using the social force model for pedestrian dynamics (Helbing, 1995). Items behaved like pedestrians crossing intersections or walking along the sidewalk. We varied the number of items, using larger set sizes than typical (20, 30 and 40 objects). In separate experiments, we measured tracking accuracy with social force motion, social force motion played backwards, random motion with social force interactions, and more traditional random motion with either overlaps or elastic collisions between objects. The number of targets varied between 4-10 objects and the tracking time was 10 seconds. At the end of 10 seconds, observers reported the tracked targets using mouse clicks and were given feedback. Tracking capacity was calculated using Pashler's K. Capacity was quite high, especially considering the visual set size. But the capacity declined as set size (and crowding) increased down to the usual 3 or 4 items for all types of motion. Social force rules did not improve tracking capacity, suggesting that the constraints on tracking may occur relatively early in motion processing.

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