Effect of time-to-collision in the interaction between pedestrians

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According to the experimental results obtained in Ref. [1], pedestrians walking in two directions show a time-to-collision interaction, apparently disregarding the spatial distance between individuals, unlike most of the best-known physical systems. This temporal dependance implies a processing of the information, i.e., a calculus of how much time the pedestrian has to avoid the collisions for given conditions. Furthermore, the interaction potential obtained with the experimental data presents a very interesting behavior

$$U(\tau) = \frac{k}{\tau^2} e^{\frac{-\tau}{\tau_0}}. \quad (1)$$

Intuitively, an interaction which produces a bigger force when the collision is very close in time is expectable, but what is the cause of a power law with that certain exponent? To undergo the question, we analyse a system with non-intelligent pedestrians, which means they repel each other uniquely with a spatial and repulsive potential.

We observe that the combination of a repulsive potential and a forcing to go in a certain direction (cross the street in one of the two possible senses) enhances an effective interaction based in the time-to-collision distance obeying the law presented in Ref. [1].

[1] I. Karamouzas, B. Skinner, and S. J. Guy, Phys. Rev. Lett. **113**, 238701 (2014).