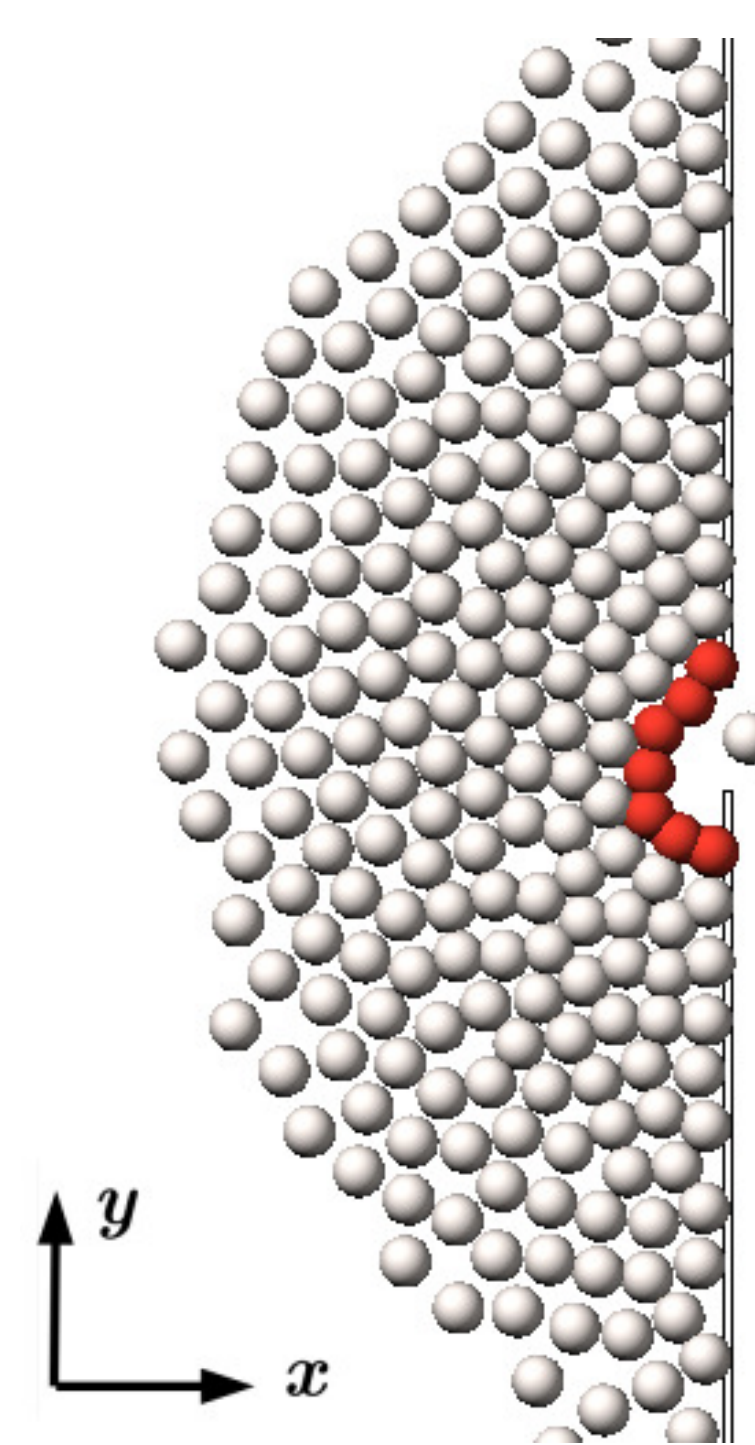


Outline

The “faster is slower” effect raises when crowded people push each other to escape through an exit during a panic situation. As individuals push harder, a statistical slowing down in the evacuation time can be achieved. However, very high pressures alters the pedestrian’s dynamics, and thus, changes the statistics of the time delays along the escaping process. The long lasting delays get reduced, while the overall evacuation performance improves. We present results on this novel phenomenon taking place beyond the “faster is slower” regime.

What’s about



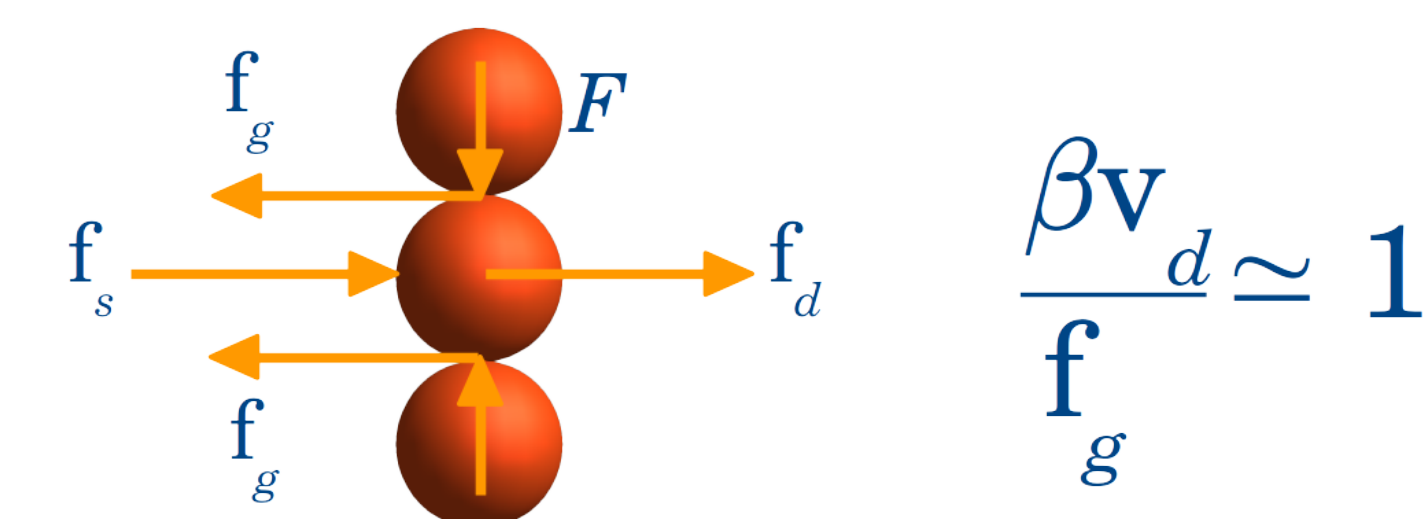
The social force model

$$m \frac{d\mathbf{v}}{dt} = \mathbf{f}_d + \mathbf{f}_s + \mathbf{f}_g$$

- \mathbf{f}_d is the desire force
- \mathbf{f}_s is the social force
- \mathbf{f}_g is the sliding friction

The minimalistic model

The pedestrians in the blocking cluster exert pressure on each other (force F). The crowd pushes the mid-pedestrian forward (force f_s).



The effects on the blocking cluster

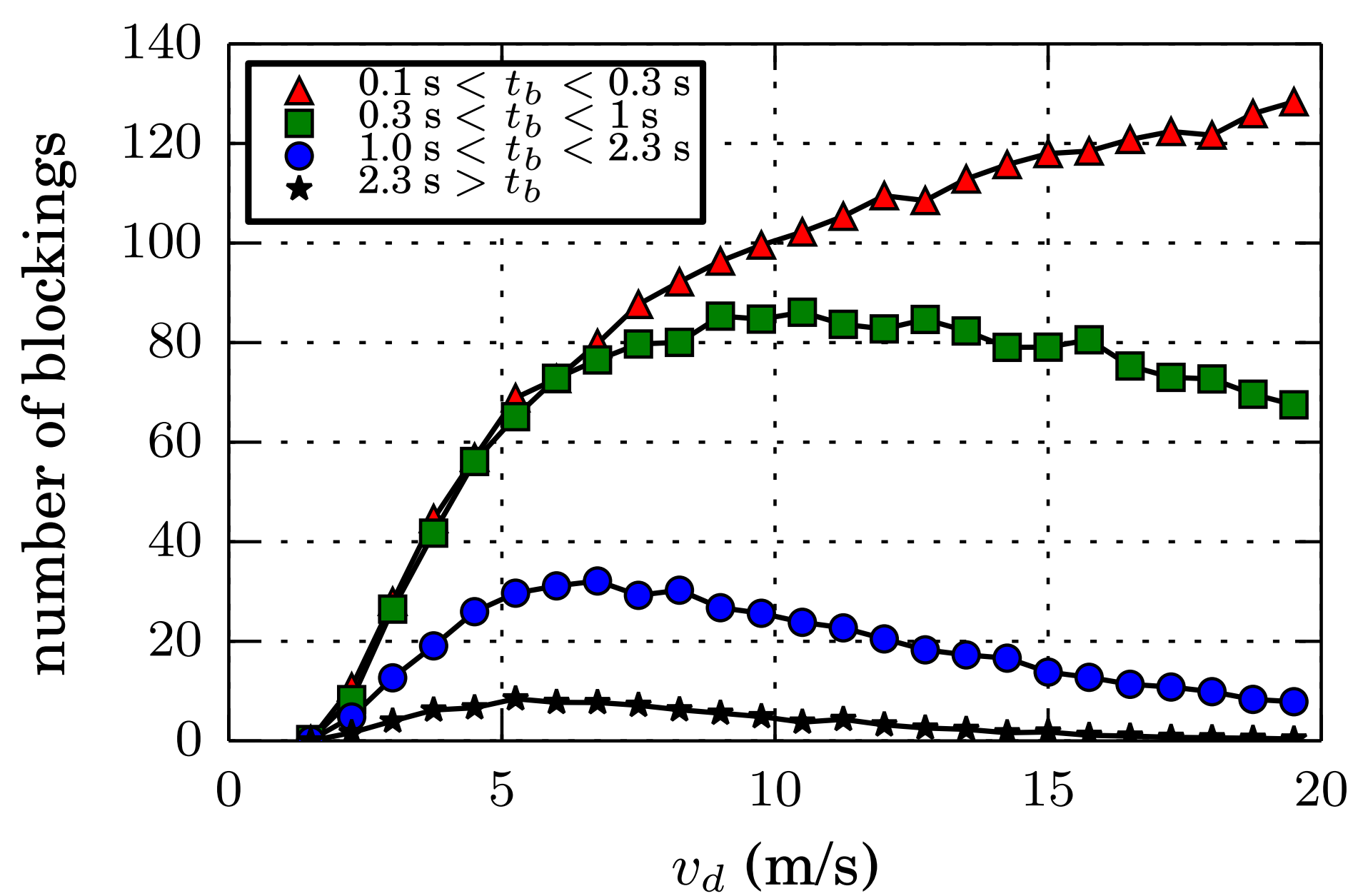


Fig 1. Mean number of blocking delays for four different time intervals vs. the desired velocity v_d .

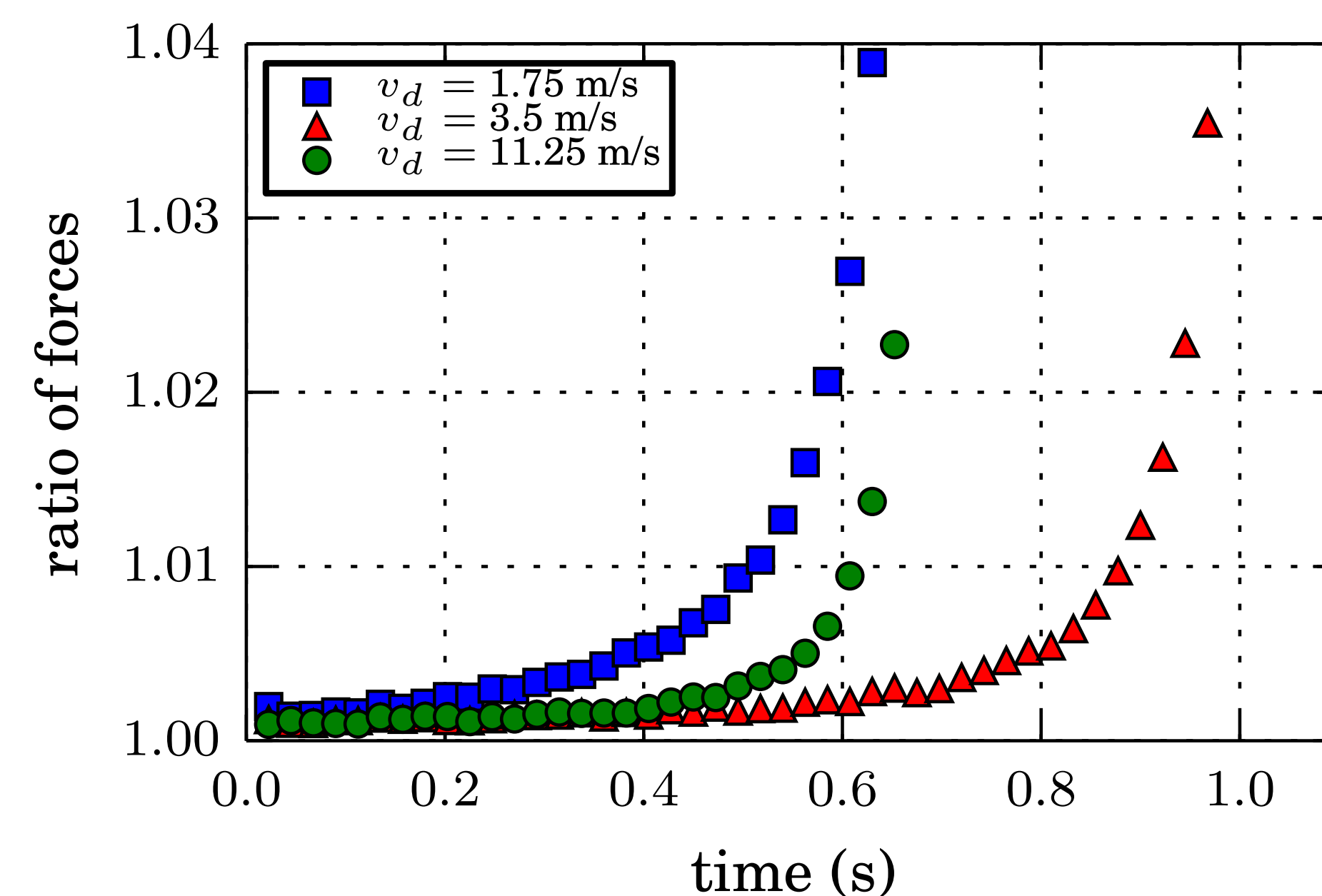


Fig 2. Ratio of positive forces (desire (f_d) and social force (f_s)), and the granular force (f_g).

The evacuation time

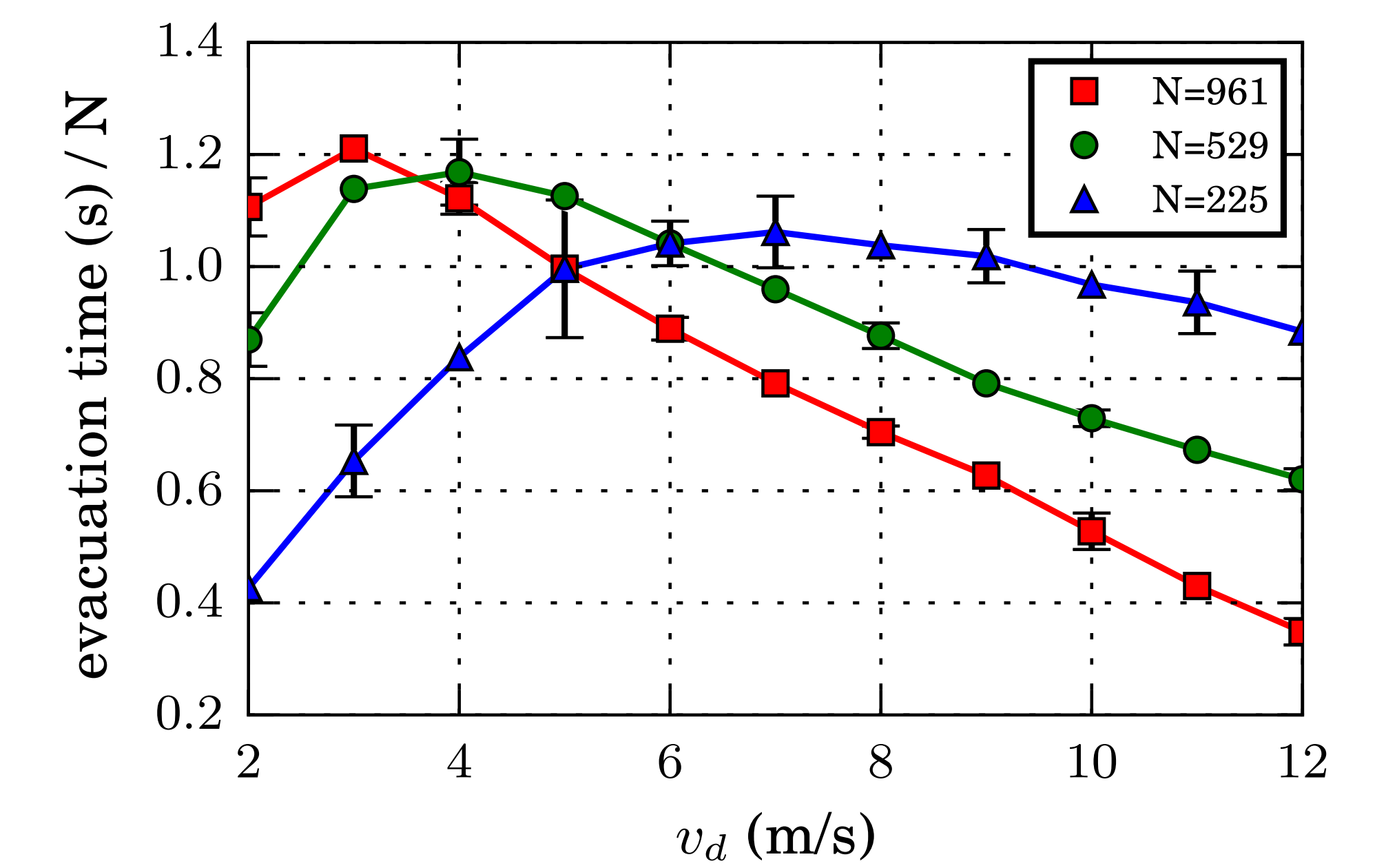
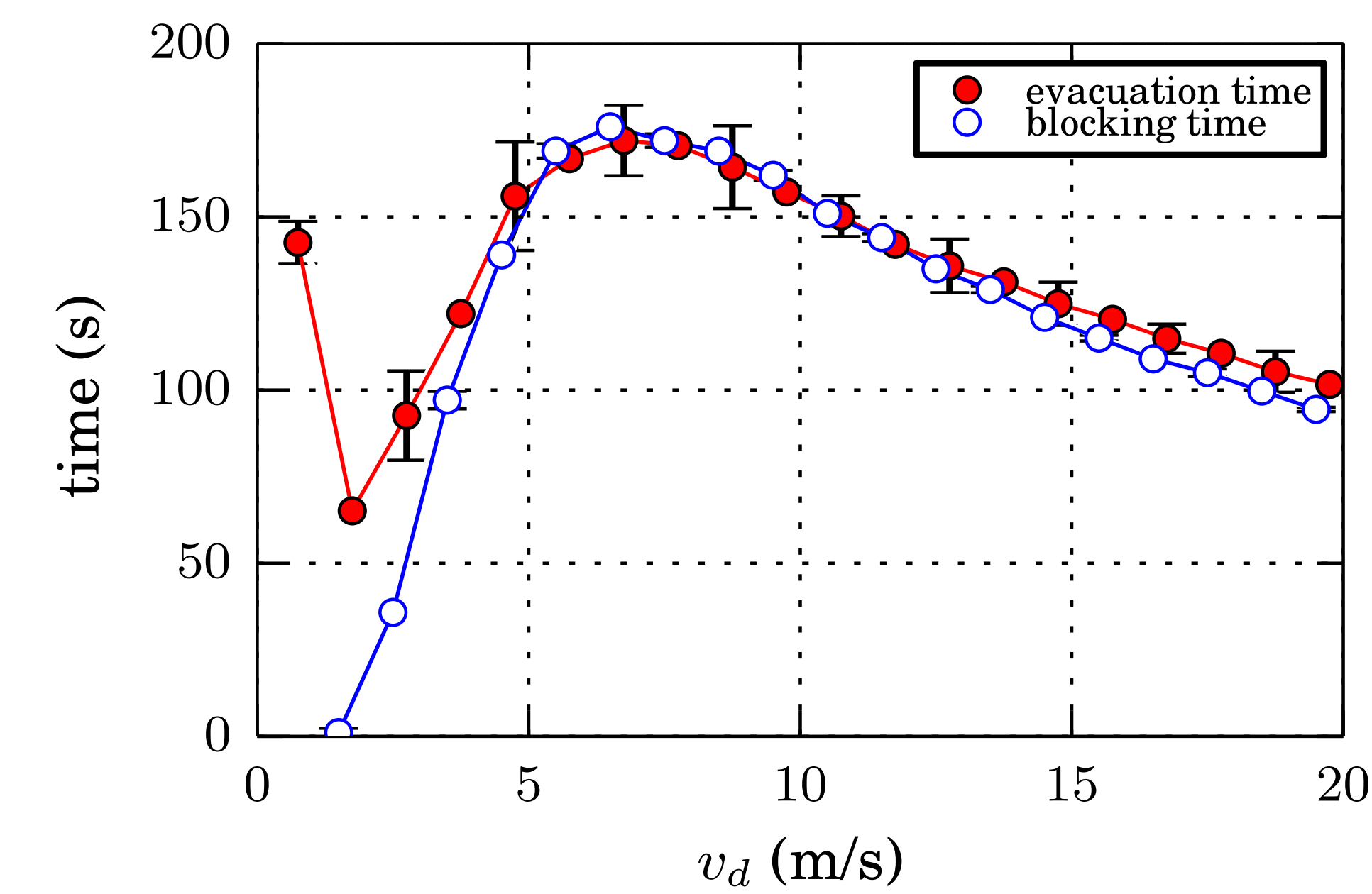


Fig. 3 (on the left) shows an improvement in the evacuation time for increasing anxiety levels (v_d). This is the *faster is faster* phenomenon.

Fig. 4 (on the right) shows that as more people push to get out (N) for any fixed anxiety level (v_d), the faster they will evacuate.

Conclusions

- ✓ Our research shows that the *faster is slower* effect comes to an end above $v_d \simeq 8$ m/s, while a novel *faster is faster* phenomenon raised (at least) until a desired velocity of 20 m/s.
- ✓ We mimicked the breakup process of a small piece of the blocking structure through a minimalistic model (of three pedestrians). We realized that a balance between the crowd’s pushing forces and the friction, with respect to the neighboring individuals held along the breakup.
- ✓ The *faster is faster* instance may be present at lower desired velocities if the crowd size is large enough.

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