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Collective Behavior of Mice Passing through a Middle-Exit or Corner-Exit under Panic

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Abstract : The existence of animal groups and collective migration are common in nature, and collective behavior is attracting more and more attention of researchers. Previous results have shown that architectural design had an important effect on the process of crowd evacuation. In this paper, collective behavior of mice passing through a middle-exit or corner-exit under panic was investigated. Selfish behavior and herd behavior were easily observed in our video, which caused the congregation with high density near the exit. Triangle structure of congregation formed near the middle-exit while arch structure formed near the corner-exit. It is noteworthy that the exit located at the middle of the wall was more effective for evacuation than at the corner. Meanwhile, the escape sequence of mouse passing through the exit was investigated, and the result showed that the priority depends largely on its location in the congregation. With the level of stimulus increasing, these phenomena still exist. The frequency distributions of time intervals and the burst sizes were also analyzed in this study to explore the secret of collective behavior of mice. These results could provide evidence for the hypothesis or prediction about human behavior in crowd evacuation. However, it is not clear whether the simulated results from different species can correspond to reality or not. Broader comparison among different species about this topic will be eager to be conducted to deepen our understanding of collective behavior in nature.

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