

## **Social norms and strategies in crowds – where pedestrian dynamics need social psychology**

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To date pedestrian dynamics have been primarily studied in the natural and engineering sciences. Pedestrians are analyzed and modeled as driven particles revealing self-organizing phenomena and complex transport characteristics. However, pedestrians in crowds also behave as human subjects on the basis of social norms, social identities or strategies. To show where pedestrian dynamics need social psychology in addition to the natural sciences the application of three categories – phenomena, behavior and action – is proposed. They permit a clear discrimination between situations in which minimal models from the natural sciences are appropriate and those in which sociological and psychological concepts are needed. To demonstrate the necessity of this framework, an experiment in which a large group of people ( $n=270$ ) enters a concert hall through two different spatial barrier structures is analyzed. Methods from the natural and social sciences are applied: Firstly, physical measurements show the influence of the spatial structure on the dynamics of the entrance procedure. Density, waiting time and speed of progress show large variations. Secondly, a questionnaire study ( $n=60$ ) reveals how people perceive and evaluate these entrance situations. Markedly different expectations, social norms and strategies are associated with the two spatial structures. The results from the questionnaire study do not always conform to objective physical measures, indicating the need for integrating subjective perspectives. Challenges for modeling such subjective perspectives in pedestrian dynamics are outlined.