

# Characteristic time in highly motivated movements of children and adults through bottlenecks

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## Appendix A. The selection of 1.05 m width bottleneck experiment of students.

In this study, we aim to investigate the similarity and difference of movement characteristics of pre-school children and university adults running through bottlenecks. Table A1 shows the shoulder breadth information of children and adults based on the *Human Dimensions of Chinese Minors (GB/T 26158-2010)* and *Human Dimensions of Chinese Adults (GB/T 10000-1988)*.

Table. A1 Selected value of shoulder breadth of pre-school children <sup>1</sup> and adults <sup>2</sup>.

People	Shoulder breadth/m	
	Male	Female
Children (median value)	0.286	0.282
Adults (18-25 years old)(90% value)	0.454	0.415

The mean height of the male students and female students is 1.76 m and 1.62 m, respectively<sup>3</sup>. Based on the standard<sup>2</sup>, 90% male Chinese and female aged 18-25 years owns a height lower than 1.764 m and 1.647 m. Considering this, the shoulder width is selected as 0.454 m and 0.415 m, meaning that 90% shoulder width of 18-25 years old Chinese is smaller than the values. Considering the gender ratio of the participants, the shoulder width of pre-school children and students is set as 0.284 m and 0.435 m, respectively.

Based on the shoulder breadth of pre-school children and of 18-25 years-old adults and the 0.7 m width bottleneck experiment of children, a 1.05 m-width bottleneck experiment of students<sup>3</sup> is selected to compare the movement characteristics passing

through the bottleneck between children and adults.

## Appendix B. Range of density and speed in the congested state in the measurement area.

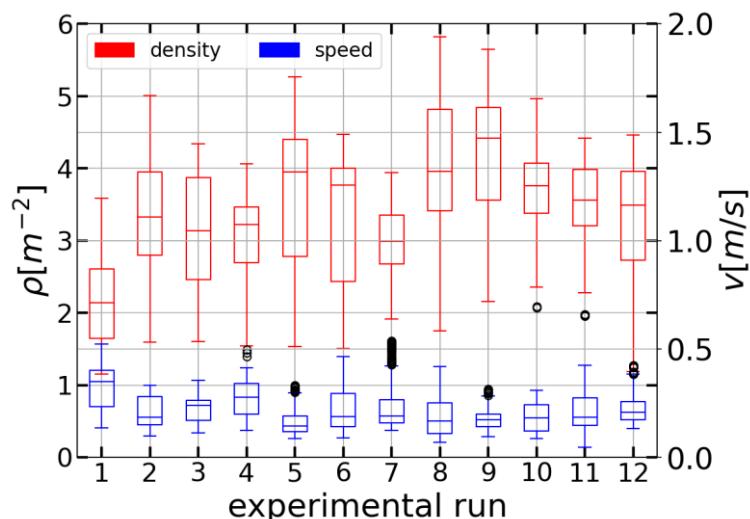


Fig. A1 Boxplot of density (red) and speed (blue) in the measurement area in the congested state. The density ranges from around 2 ped/m<sup>2</sup> to 6 ped/m<sup>2</sup>. The speed ranges from 0 m/s to 0.5 m/s.

### References

- 1 Supervision, C. S. B. o. T. Vol. GB/T 26158-2010 (China Standard Press, 2011).
- 2 Supervision, C. S. B. o. T. Vol. GB/T 10000-1988 17 (China Standard Press, 1988).
- 3 Li, H., Zhang, J., Song, W. & Yuen, K. K. R. A comparative study on the bottleneck pedestrian flow under different movement motivations. *Fire Safety Journal*, 103014, doi:<https://doi.org/10.1016/j.firesaf.2020.103014> (2020).