

A Study of Bicycle Travel Speed

Traffic Engineering Division, Road Department
 YAMAMOTO Akira (Research Engineer), KOBAYASHI Hiroshi (Senior Researcher),
 UESAKA Katsumi (Doctor of Engineering)

Keywords: Bicycle, travel speed, cycling space

1. Introduction

Bicycle travel speed is seen as a promising indicator for studies of bicycle network plans aimed at promoting bicycle use and securing safe cycling spaces.

While studies of spot speed are available in existing research, there are few studies on long-distance travel speed. In this paper, we present an interim report for a study of travel speed during cycling on flat roads of 5 to 6 km in length.

2. Free bicycle travel speed

We defined free travel speed as cycling speed that is not affected by road width, traffic volume, traffic signals, or other factors. Then, using NILIM's test course (approximately 6.1 km for one circuit), we conducted an actual cycling study using a standard bicycle for casual riding and an electric power-assisted bicycle (hereafter "e-bicycle"). The results showed that, while the e-bicycle was faster than the standard bicycle in terms of average free travel speed, their maximum speeds were the same (Figure 1). Moreover, we found that the faster a person cycles on the standard bicycle, the more the speed difference between the standard bicycle and the e-bicycle narrows (Figure 2). In addition, although we found some differences in free travel speed due to gender and age, these differences were not significant.

3. Bicycle travel speed on public roads

We set up a course with a circuit of approximately 5 km that was comprised of a bicycle lane, sidewalk for use by bicycles and pedestrians, vehicle lane, and narrow street in Kameido, Koto Ward, Tokyo. We then conducted an actual cycling study on this course. From the results, we found that travel speed that includes waiting for traffic signals was much lower than free travel speed (Figure 3). This is thought to be a result of the signal waiting time and the cycling spaces. When we studied travel speed by type of cycling space, we found that speed dropped significantly on the sidewalk for use by bicycles and pedestrians (Figure 4). In addition, we discovered that travel speed on this sidewalk had a positive correlation with pedestrian density (sidewalk crowding).

4. Conclusion

Looking forward, we plan to quantify the effect caused by waiting at traffic signals and study a simple equation for estimating bicycle travel time.

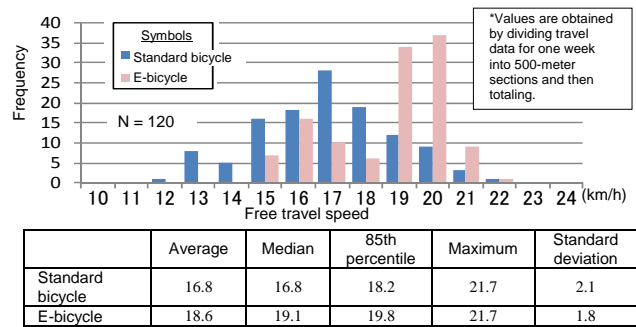


Fig. 1: Distribution frequency of free travel speeds and pertinent data

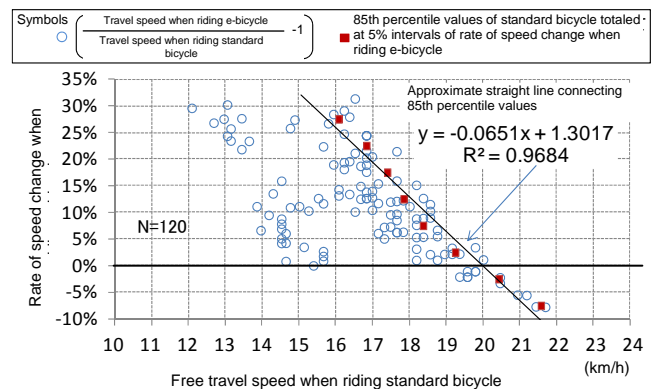


Fig. 2: Comparison of speed differences of standard bicycle and e-bicycle

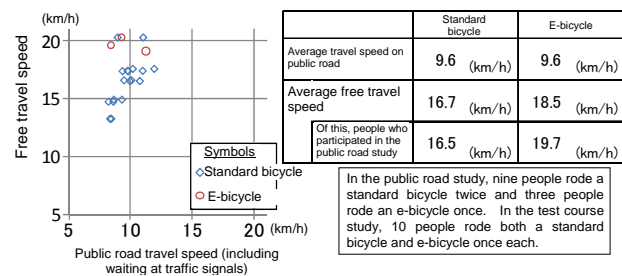


Fig. 3: Comparison of travel speed and free travel speed on public roads

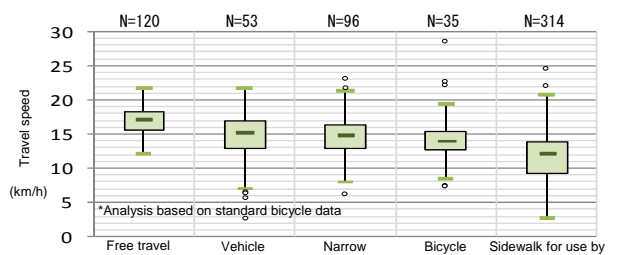


Fig. 4: Relationship between travel space and bicycle travel speed