

Research on offering information to drivers aiming to help prevent car-to-bicycle crossing collisions

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V2X communication is considered to be one of useful methods to help prevent car-to-bicycle collisions, but the issue is how and when vehicles should offer collision possibility to drivers considering V2X communication property. In this study, we investigated an appropriate method of offering on-coming bicycle information in a driving simulator experiment on a residential road environment where there is a risk of crossing collision with a bicycle (Fig.1).

As a result, it was found that the case of TTC (Time to collision) 5.5 was chosen as the most appropriate Advisory timing to help avoid collision with the bicycle (Fig.2), and the timing coincides with the timing of releasing accelerator (Fig.3).

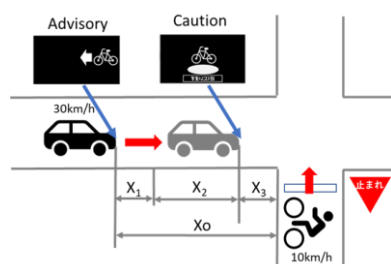


Fig.1 Position of offering information timing

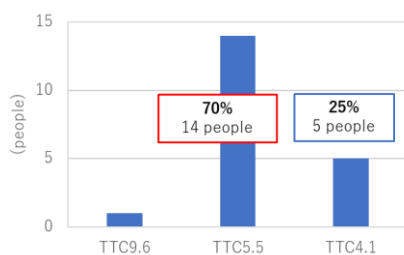


Fig.2 Number of the most appropriate Advisory timing (N=20)

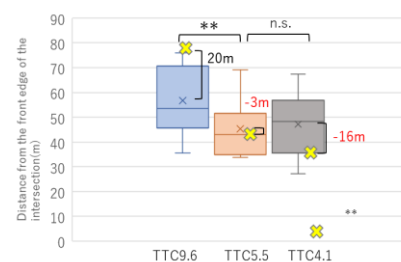


Fig.3 Position where accelerator was released (N=10)

Comparing the deceleration behavior after on-coming bicycle information is offered with the ordinary deceleration behavior during just approaching a stop intersection, it was seen that accelerator releasing timings were similar (fig.4). On the other hand, the step-on braking timing after the information is offered is slower than the step-on braking timing while ordinary approaching a stop intersection (Fig.5). It is considered that this is because the drivers do not start deceleration but start preparing for immediate stop after they notice the on-coming bicycle information.

In addition, according to the passing speed survey at intersections with no stop sign, about 20% of cases run through at 25 km/h or more (Fig.6). Speeds above 25 km/h have higher collision risk that offering information to drivers traveling at such speeds is thought to be effective in help preventing bicycle collisions by inducing deceleration behavior.

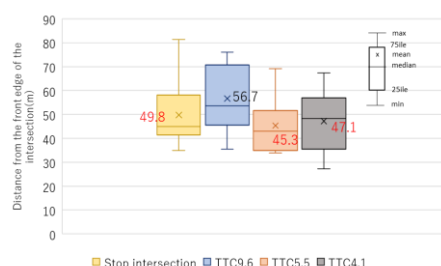


Fig.4 Position where accelerator was released (N=10)

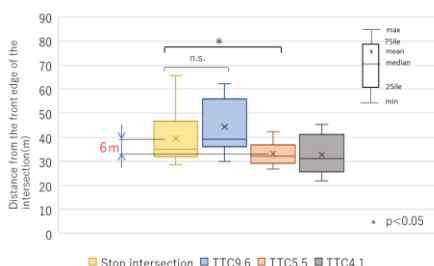


Fig.5 Position where brake pedal was stepped on (N=10)

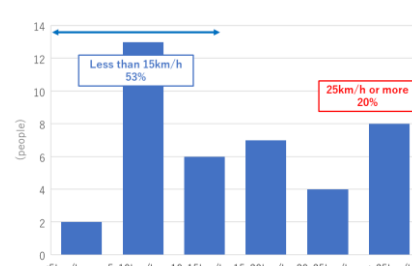


Fig.6 Passing speed distribution at intersections with no stop sign (N=40)

Through the research, it was found the caution information to notify drivers that the bicycles might exists close to the cars is sometimes unnecessary. Keeping on measuring and calculating both vehicles location would be required to avoid such nuisance.