

Investigation of effectiveness and conflict of road projection lamp, using VR system

- Accident prevention for bicycle rider -

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In Japan, pedestrians and bicycle riders account for more than 50% of all traffic accident fatalities. Therefore, it is necessary to take measures to reduce fatal accidents. As one of the measures, the road projection lamp is suggested as a way to help road users to recognize approaching vehicles. Compared to pedestrian, bicycles have high speed and long braking distance, so road projection for bicycles is presumed to be more effective in reducing accidents by early informing presence of vehicle. The purpose of this research was to verify the effectiveness of a road projection for bicycle riders. We used Virtual Reality(VR) system to ensure participants' safety and to set various experimental conditions.

In experiments, participants rode a bicycle (Fixed to a stand) and wore VR-Head Mounted Display in the dark room. Watching VR movie, participants' recognition of approaching vehicle was measured at the scene shown in Figure 1 and Figure 2. Two projection conditions were used: 1) Projection on the road or, 2) No projection.

Figure 3 shows the experiment for evaluation of effectiveness that cognitive reaction time with road projection is significantly shorter than that without road projection(Right turn scene:0.92s, left turn scene:0.64s, significant difference was confirmed in both scenes). We confirmed the effectiveness of road projection.

Figure 4 shows the experiment of conflict scene that road projection did not change cognitive reaction time significantly (Right turn scene:0.02s, left turn scene:0s, significant difference was not confirmed in both scenes). We did not confirm the conflict of reaction delay that occurred from road projection.

Therefore, we were able to do these verifications quantitatively by using VR system.

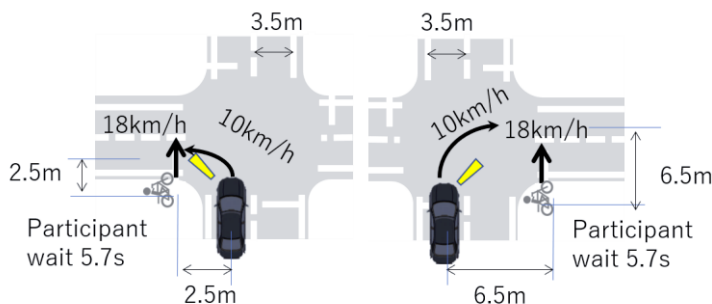


Fig.1 Layout of effectiveness investigation
(Left:left turn scene, Right:right turn scene)

Scene	Left turn	Right turn
Cognitive reaction time		
Difference[s]	0.92	0.64
P value	2.66×10^{-5}	0.002

Fig.3 Comparison of average cognitive reaction time of effectiveness investigation

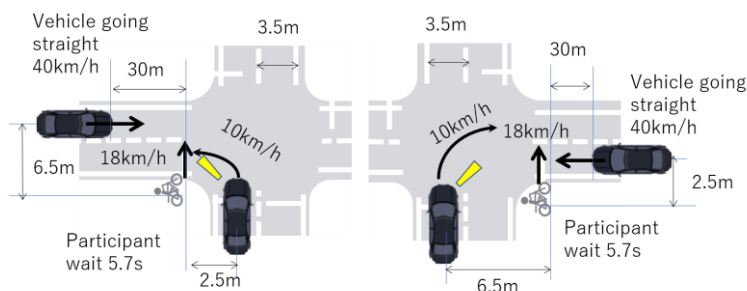


Fig.2 Layout of conflict investigation
(Left:left turn scene, Right:right turn scene)

Scene	Left turn scene	Right turn scene
Cognitive reaction time		
Difference[s]	0	0.02
Significance test	Not confirmed(p=0.33)	Not confirmed(p=0.41)

Fig.4 Comparison of average cognitive reaction time of conflict investigation