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# Effect of Pedestrian Information on Drivers' Behavior during Driving

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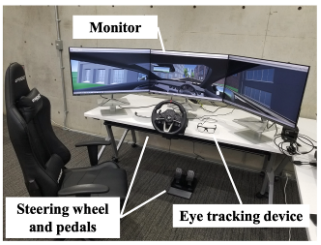
In 2021, there were 2636 fatalities due to road accidents in Japan, of which 941 (36% of the total) were pedestrian fatalities. The highest number of accidents involving fatal pedestrians occurred while crossing. Therefore, pedestrian protection during crossing is an important issue.

In recent years, automated driving, sensing technologies, and data communication environments have been developed to reduce traffic accidents. As a result, it is possible to provide drivers with various information. Research and development are underway to improve safety through human machine interface (HMI), which can provide information to drivers. By providing information to the driver using HMI, drivers can drive in anticipation of dangerous situations while driving. On the other hand, elderly drivers would process information slower than younger drivers, and the HMI information may confuse elderly drivers. To effectively use HMI by wide age ranged drivers, it is necessary to understand driving characteristics of drivers including the elderly. Therefore, the purpose of this study is to clarify the effects of pedestrian information provided by HMI on the driving characteristics of young and elderly drivers by comparing different age groups.

In this study, we conducted experiments for elderly participants (average: 68.9 years) using a simplified driving simulator (Fig.1(a)) that provided the pedestrian information by HMI, as shown in Fig.1(b). In the experiment, participants drove the ego vehicle (white sedan) with and witout HMI in the scenarios that included six intersections (Cases 0–5) and two straight roads (Cases 6 and 7).

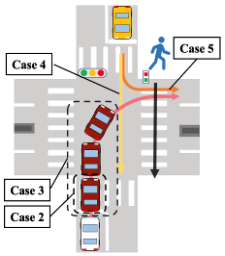
We analyzed the time to collision (TTC) to evaluate the possibility of vehicle collisions involving pedestrians. TTC was defined when the driver first gazed at the pedestrian in intersections or straight roads to reaching the point of a potential collision with the pedestrian. TTCs of elderly group were compared to the TTCs of younger group obtained in the previous study under the same conditions, as shown in Fig. 3. In the elderly group, the average TTCs with HMI increased in three conditions (Cases 3, 6, and 7) and decreased in four conditions (Cases 1, 2, 4, and 5) compared to those without HMI. The average TTC of the elderly group was longer than that of the young group in all conditions except for the condition without HMI in Case 7. That of the elderly group in Case 1 was significantly longer than that of the young group. These results suggest that the elderly group might drive more cautiously than the young group. The results also revealed that the presentation of pedestrian information by the HMI could be effective to make drivers aware of the existence of pedestrians in situations when three preceding vehicles made a right turn at an intersection and a pedestrian crossed from the blind spots of parked vehicles on a straight road, regardless of the different age range of the drivers.



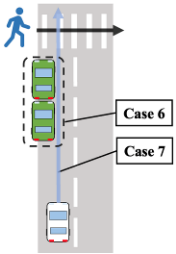

(a) Hardware configuration

(b) HMI

Fig.1 Driving simulator




(a) Intersection




(b) Straight road

Fig.2 Experimental scenario

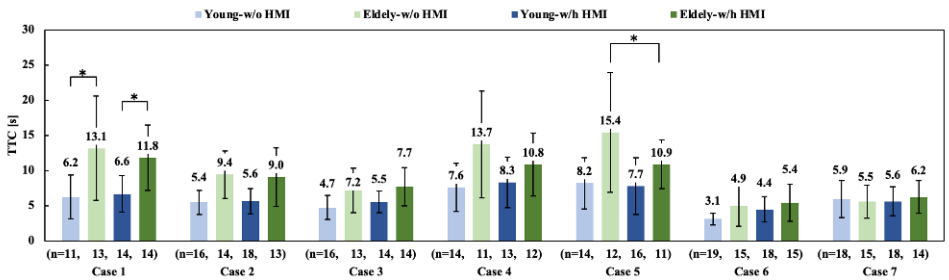



Fig.3 Average TTCs when the driver first gazed at the pedestrian at the intersection for Cases 1–5 (turning right) and on the straight road for Cases 6 and 7 (going straight) (*: $p < 0.05$)