Examination of accident prevention measures due to incorrect brake and accelerator pedal pression (First Report)

-Artificial occurrence of pedal misapplication situation and observation of driver's reaction -

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Traffic accidents caused by pedal operation mistakes are difficult to deal with and are of great social interest. It deals with the " pedal misapplication " that the driver mistakenly steps on the accelerator pedal as the brake pedal. The mortality rate of pedal misapplication accidents is about 20 times the mortality rate of all accidents, and measures to prevent pedal misapplication accidents are an urgent issue. Many previous studies have focused on investigating the cause of pedal misapplication, and have obtained situational evidence and hypotheses by observing bench experiments and normal driving conditions. This is a clue to the cause of the pedal misapplication, but the psychological situation of the driver and the reaction of the driver when the pedal misapplication operation should occur have not been clarified very much. The frequency with which the driver makes a pedal misapplication in daily driving is extremely low. Therefore, it is difficult to actually observe the " pedal misapplication situation" such as the situation where the pedal misapplication operation cannot be correctly shifted to the braking operation due to panic. This is a measure barrier tom research in this field. If the pedal misapplication situation   can be artificially realized, effective measures to prevent pedal misapplication can be quantitatively examined and evaluated. Furthermore, it may be possible to contribute to the investigation of the cause of situation operations. Therefore, in this research, we examined a method to artificially realize the pedal misapplication situation.

Participants in the experiment were required to have an ordinary driver's license, and a total of 72 people, including 17 young people (20-39 years old), 7 middle-aged people(40-64 years old), and 48 elderly people(65 years old-), cooperated.The experiment was conducted using a method of inducing a pedal misapplication operation by moving the pedal 100 mm to the left so that the participants of the experiment would not notice it. However, simply moving the pedal did not make it possible to correctly realize the actual pedal misapplication situation. It became clear that three conditions, the reality of the experiment, the imprinting of the pedal position, and the urgency of the driver, are important as the necessary conditions for observing the reaction close to the actual pedal misapplication. In addition, we believe that by satisfying these conditions, it has become possible to appropriately realize the pedal misapplication situation.

Furthermore, when observing the reactions of the experimental participants when they made a pedal misapplication using this method, it was found that in the analysis by age group, the older they were, the later they noticed the pedal misapplication. In addition, the results of the questionnaire conducted after the experiment showed the ambiguity of the awareness of the foot position. It was also found that many drivers drive without noticing the lateral change of 100 mm. By using this method, it will be possible to observe the driver's reaction when a pedal misapplication is made, which was not possible until now.
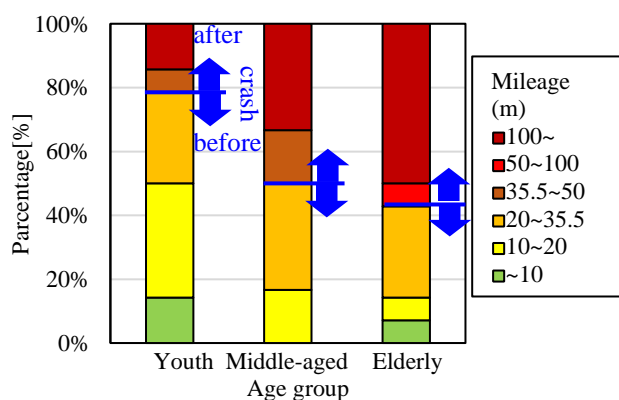

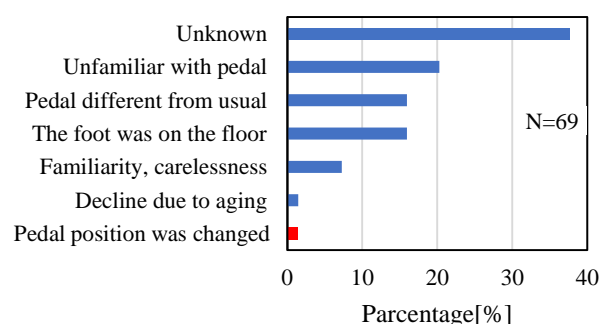Fig. 1 Mileage at the end of pressing the accelerator pedal
(By age)

Fig. 2 Cause of pedal misapplication errors
（Questionnaire results）