

Relationship between driving risk assessment test using touch panel display and compensation intention and driving behavior

- Study on Driver Characteristics for Delaying Driving Cessation (35)-

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It is believed that the decline in various functions due to aging increases the risk of traffic accidents. However, this study hypothesizes that even if various functions decline to some extent, the increase in accident risk will be limited if drivers have enough meta-cognitive abilities, are aware of their functional decline, and take appropriate compensatory actions.

To test this hypothesis, we developed a test that pointed out points to watch in a 3DCG movie from the driver's point of view while driving at a fixed velocity, and obtained data on actual performance on the test and self-evaluation (self-monitoring among meta-cognition), and then velocity selection when driving on the same road (self-control among meta-cognition). The study was conducted in the following procedure. A driving instructor also accompanied the participants on a 30-minute drive on a public road to evaluate their driving.

The test consisted of pointing out "objects that need to be checked for safe driving" from a 3DCG image from the driver's viewpoint presented on a 21-inch touch panel display by pointing out with a finger. The driving scene consisted of a straight road with no center line at a constant velocity of 40 km/h. It included six intersections (two of them were signalized intersections), cars emerging from alleys, and pedestrians crossing the road. Blind spots on the road, traffic signals, and signs were also set as "objects that need to be checked for safe driving," and whether the experiment participants were able to touch these objects was recorded. The participants were told which objects to touch in the instructions, but these objects were not displayed on the screen during the experiment.

One hundred and eighty elderly drivers were asked to take the test, and after the test, they were asked to self-evaluate how well they were able to point out the "objects necessary for safe driving". They were then asked to choose the velocity at which they will drive again on the same road from a list of options ranging from 20 km/h to 60 km/h in 5 km/h increments. Furthermore, 150 of these drivers were asked to drive on public roads for about 30 minutes with a certified driving instructor riding in the passenger seat, and the frequency of inappropriate velocities and the overall driving scores were recorded. The time required for the TMT (Trail making test)-B was used as a representative value of cognitive function.

The results of the analysis showed that the lower the cognitive function, the lower the test performance and the lower the overall evaluation of actual driving. The correlation between test performance and actual driving evaluation showed a significant trend. Cognitive function and self-estimation on the test result and self-monitoring (the gap of actual performance on the test and self-estimation). Self-estimation and self-monitoring were not significantly correlated with velocity selection. However, the higher the velocity selected during the test, the more frequently the velocity was rated as inappropriate by the instructor. To test the hypothesis, the median time required for the TMT-B (33.3 seconds) was used as the criterion for grouping high/low cognitive function. And to separate high and low self-monitoring ability, participants were grouped according to whether the difference between their actual performance on the test and their self-assessment was less than 10% or greater than 10%. An analysis of variance of the two factors using the instructor's overall driving evaluation score as the dependent variable showed that the significant interaction. The drivers with appropriate self-monitoring even if their cognitive function was impaired did not differ from drivers with no cognitive function impairment in their driving evaluation by the instructor. However, drivers whose cognitive function and self-monitoring ability were both impaired had significantly lower instructor driving ratings than the other groups, supporting the hypothesis of this study (Fig.1).

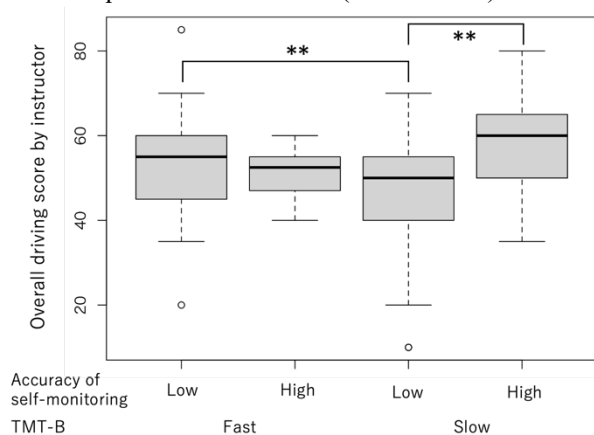


Fig.1 interaction at over all driving score self-monitoring and cognitive function