Measurement of the Spare Mental Capacity of Automobile Drivers by the Dual Task Method

We can conceive a driving situation-dependent interface that can present verbal information to drivers behind the wheel at appropriate timing. To realize such an interface, it is important to presume drivers' spare mental capacity based on the measured driving operation and situation. In this connection, we quantified the spare mental capacity of automobile drivers using the dual task method and investigated the association with various measured values¹). In addition, we studied the possibility of estimating the spare mental capacity in real time.

Topics

We had the driving and memory tasks carried on simultaneously and quantified the spare mental driving capacity by rating the memory task.

As **Fig. 1** shows, the memory task presents five spoken words. The subject memorizes the words presented. After this, a signal is sounded and the





Fig. 2 Measured data.

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subject answers the words in random order. The subject does not have to answer words he does not remember.

The driving task was set for a round trip on a twolane road. The selected subjects were three males between 33 and 43 years of age. The round tripdriving test of about 15 minutes was conducted five times for each. The subjects were well used to the tasks as they had practiced them before the actual test.

Fig. 2 shows the ratings of the memory tasks during the test runs and an example of the temporal variation of the various measured values. The subjects can normally memorize four to five words. But the number of words drop sharply depending on the driving conditions, indicating that the memory task rating provides a quantitative index on the spare mental capacity of drivers.

Fig. 3 shows the result of the memory task rating separated from the measured values on the basis of the test results. The result of the memory task is divided into high and low rating groups, implying the possible estimation of spare mental capacity while driving.

Based on the results, we were able to estimate that there is spare mental capacity while driving in real time using a driving situation-dependent interface.

Reference

 Uchiyama, U., Kojima, S., Hongo, T., Terashima, R., and Wakita, T.: "Measurement of the Spare Mental Capacity of Automobile Drivers by the Dual Task Method", Human Interface Symposium '99, (1999), 617 (Report received on Jan. 31, 2000)



Fig. 3 Estimation of spare mental capacity.
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