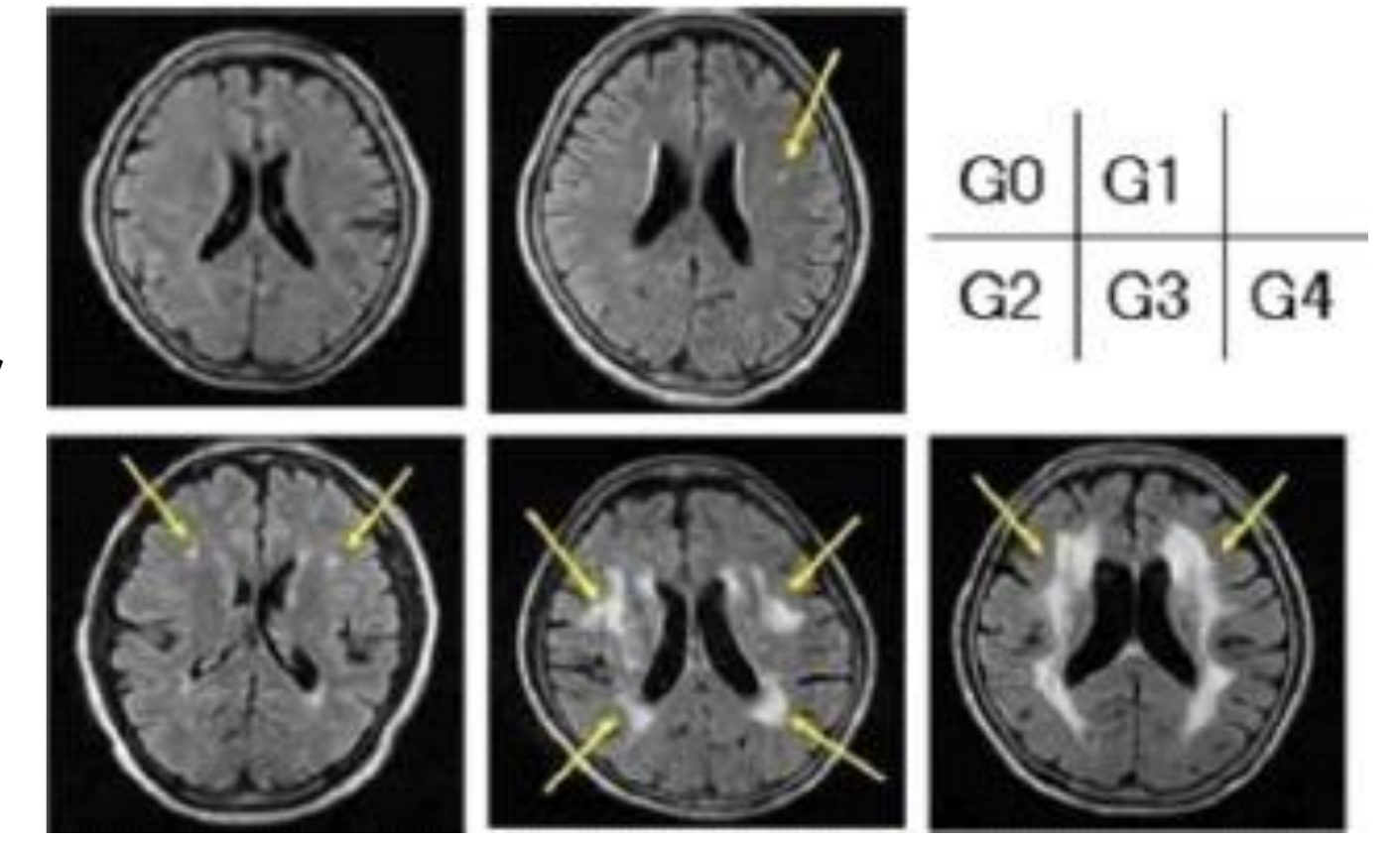


Evaluation of Driving Ability of Elderly Drivers with White Matter Lesions

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Introduction

White matter lesions are small areas of dead cells found in parts of the brain, which are commonly found in the brains of the elder people. There are five grades for white matter lesions: G0, G1, G2, G3, and G4. The driving abilities of G0 and G2 subjects, who are over 50, are examined as well as subjects at 20s.



(by Prof. Kaecheng Park)

Experiments

Subjects and test course

Elderly drivers with G2 and G0 and younger drivers in 20s with G0 were cooperated with the actual-vehicle driving experiment. The experiments were conducted on the course in the Driver and Vehicle Licensing Center of Kochi Prefectural Police Department.

Workloads

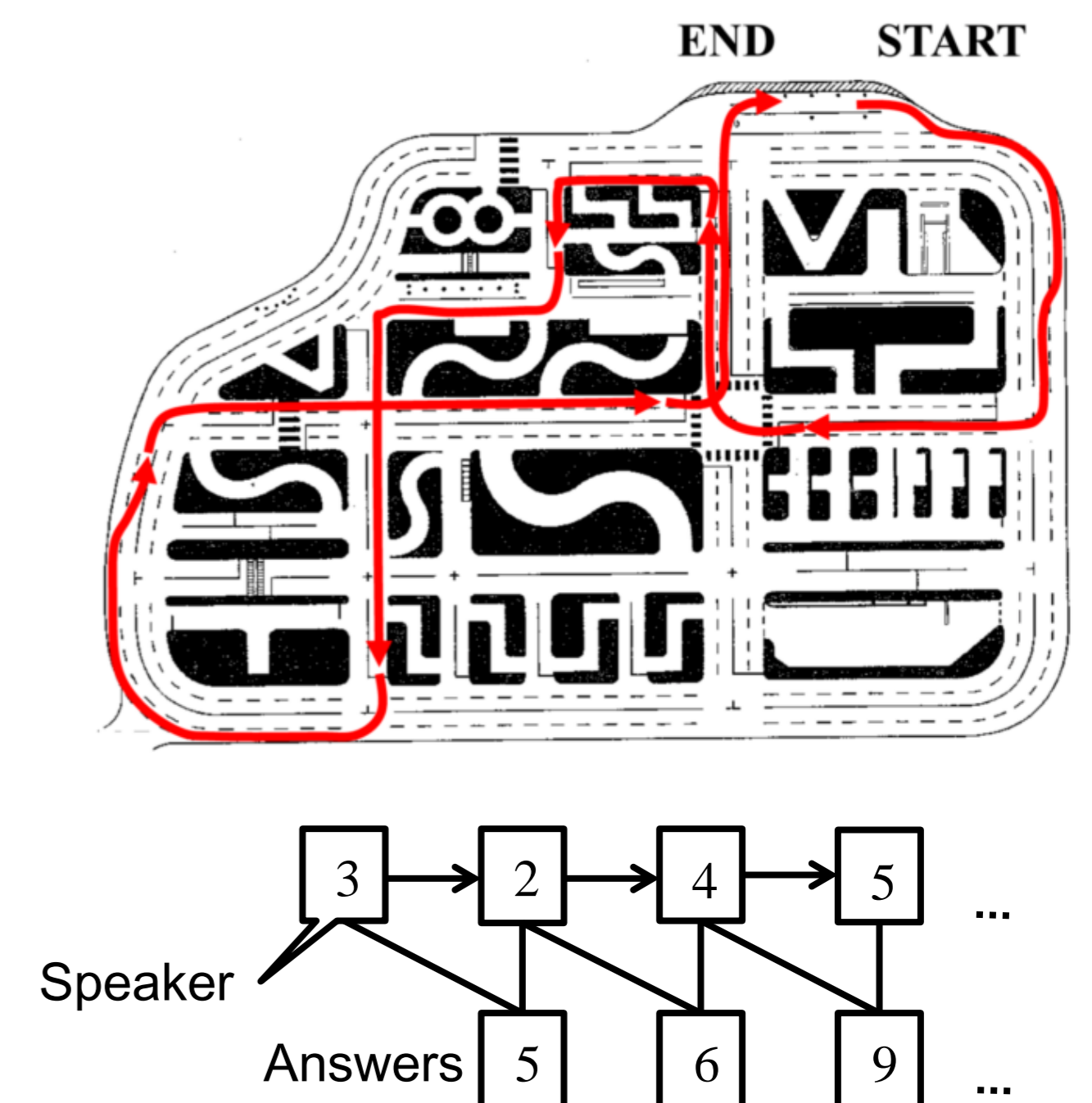
Paced auditory serial addition test (PASAT) was used to cause the distraction during the driving. It is a serial number sound every 3 seconds, and drivers are asked to answer the result of the hearing number adding the formerly hearing number. Other cars were also introduced to the course as the additional workload on driving itself.

Driving skill rating

It is based on the way of driving license testing in Japan. The mistakes, such as lack of confirmation of involvement in turn, are rated as 1, 2, and 4 evaluation credits according to their seriousness.

Steering entropy

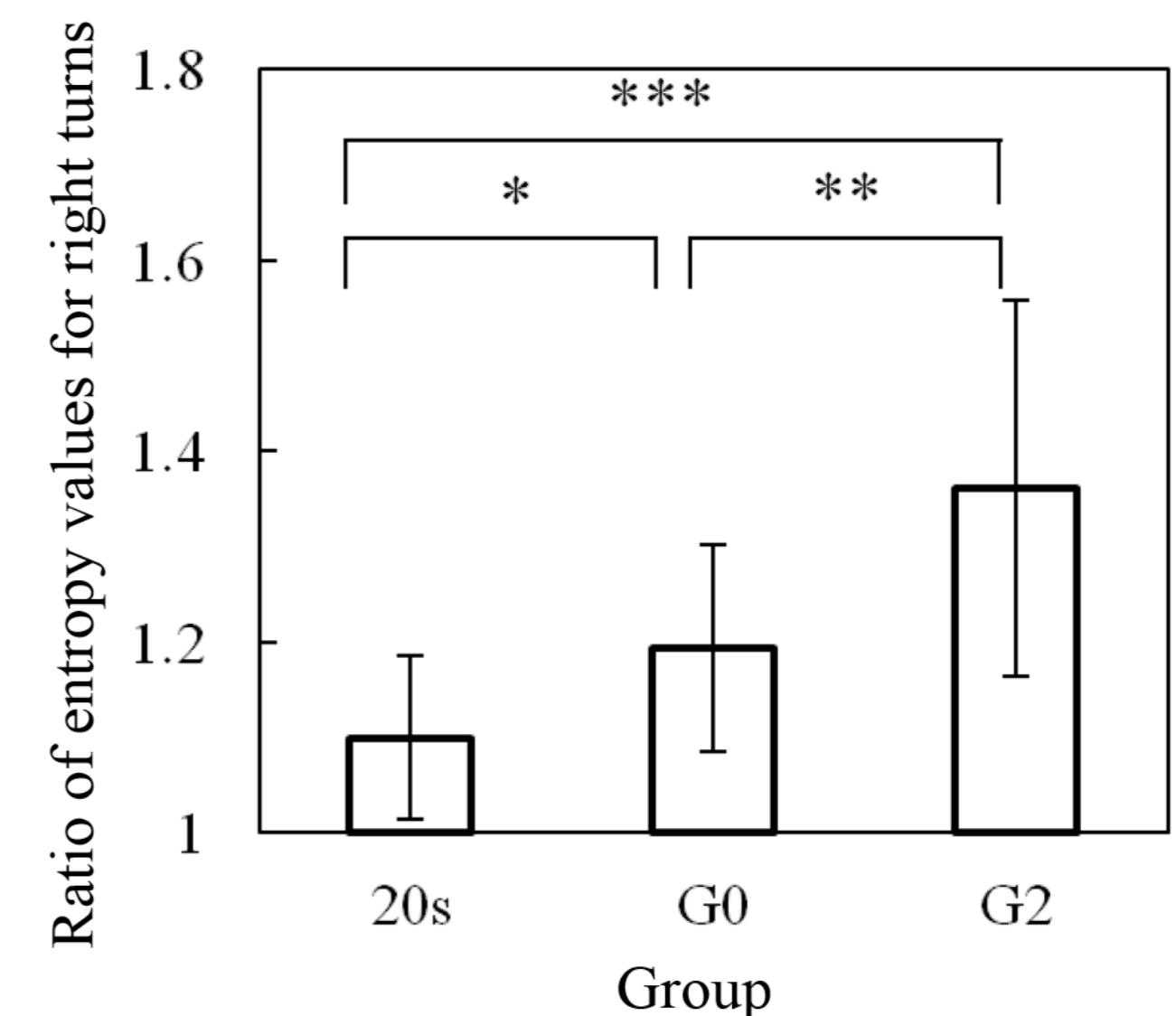
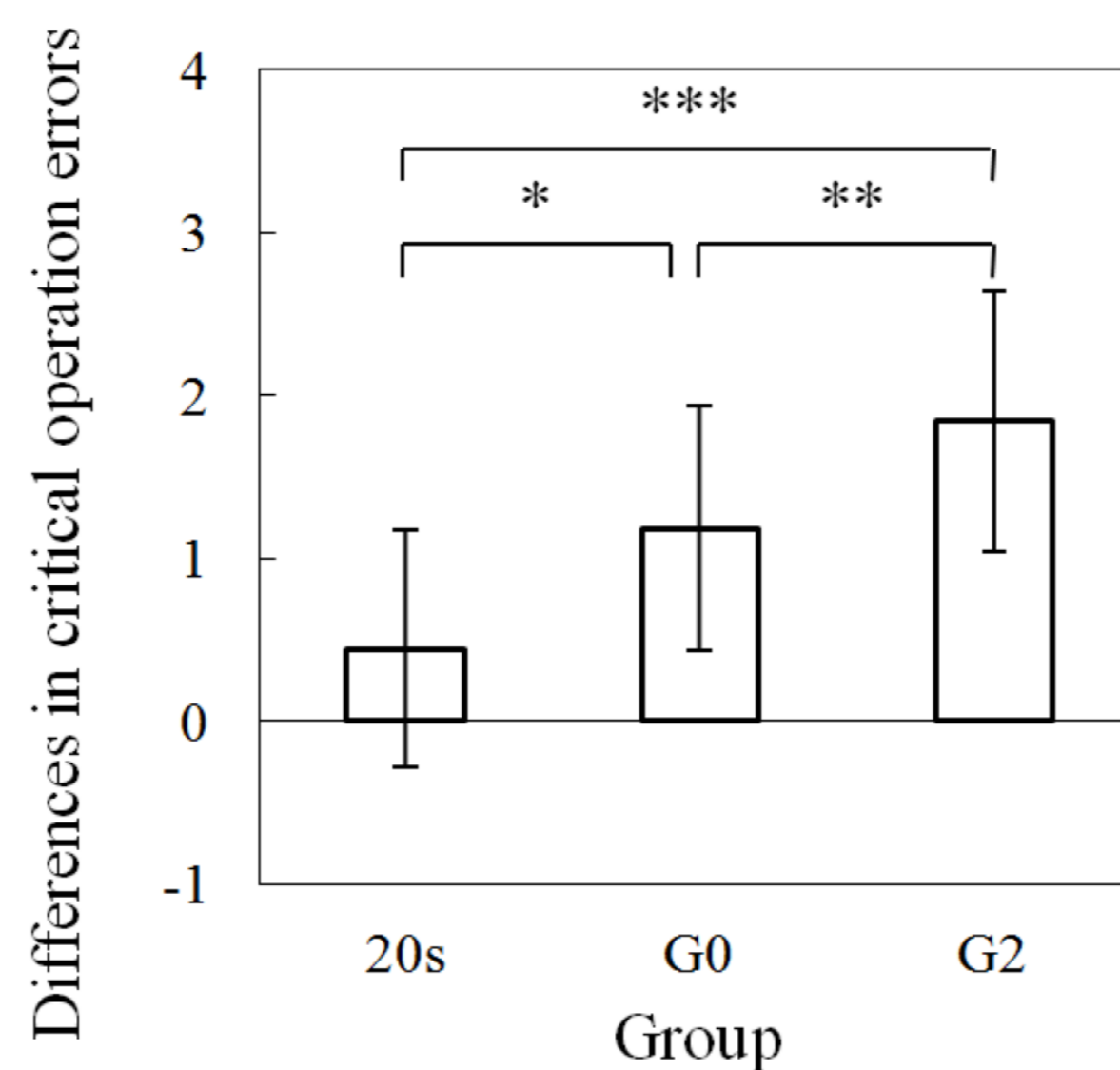
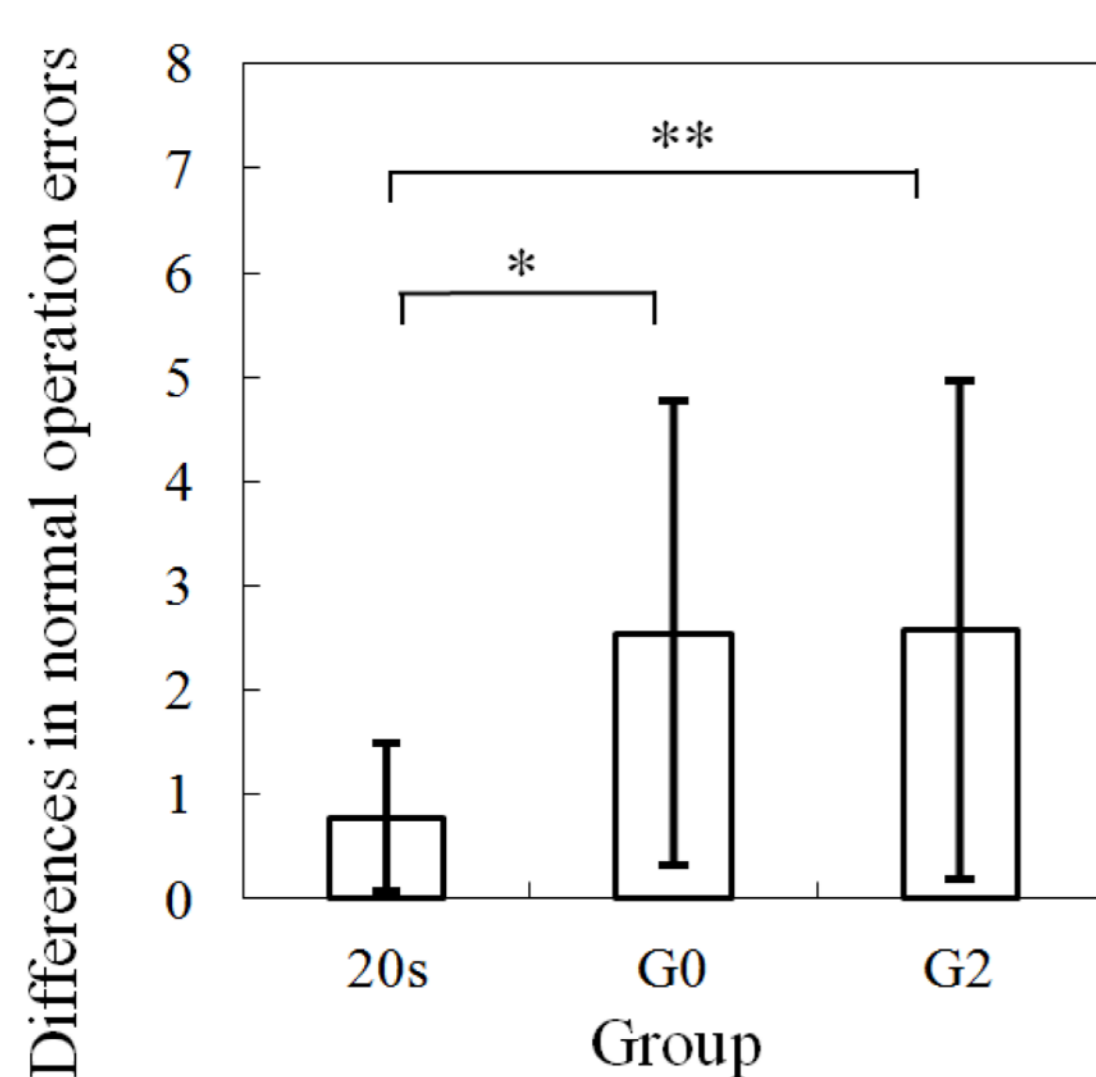
It is an evaluation index of the smoothness of steering operations. It is obtained from the steering angle, which was measured during the test with 6-axis accelerometers.



Results

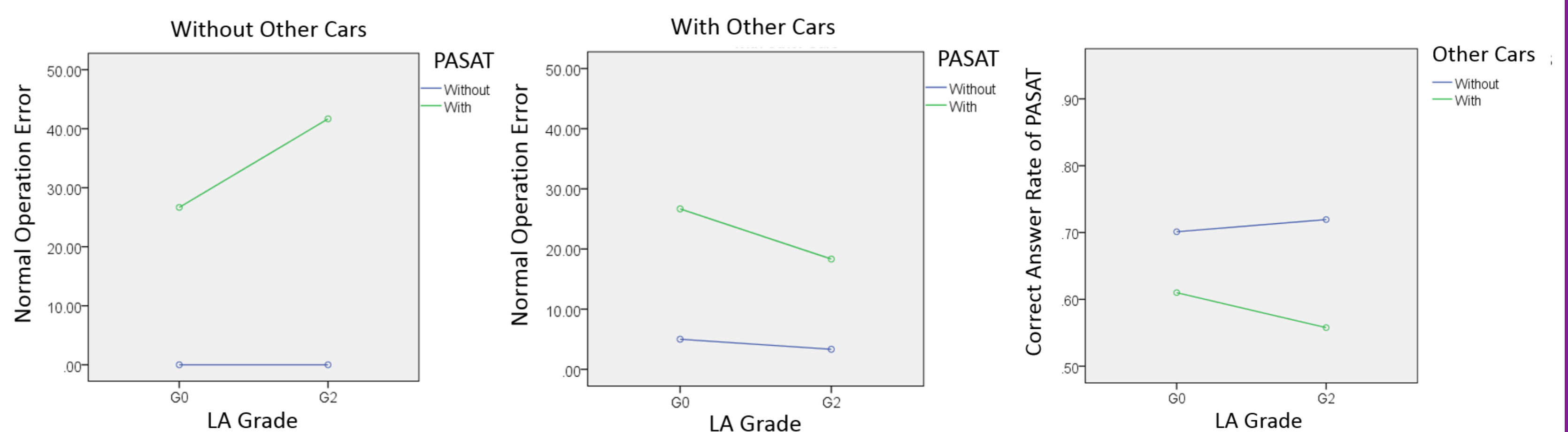
Effect of PASAT on driving characteristics (33 subjects)

PASAT worsen the driving skill rating and steering entropy throughout all the categories of the subjects; G0, G2, and 20s. However, the ratios of the deterioration are more serious in the order of G2, G0, and 20s.



Effect of other cars on driving characteristics (6 subjects)

In the case where other cars travelling on the course, the PASAT performance of G2 is worse than that of G0, and the deterioration in driving performance is less in G2. This implies that elderly drivers with G2 try to keep their attention to driving rather than PASAT when the driving workload is high.



Publications

Nakano K., Park K., Zheng R., Fang F., Ohori M., Nakamura H., Kumagai Y., Okada H., Teramura K., Nakayama S., Irimajiri A., Taoka H., Okada S., 2014, Leukoaraiosis Significantly Worsens Driving Performance of Ordinary Older Drivers, PLoS ONE 9(10), e108333. DOI:10.1371/journal.pone.0108333.

Kaizuka T., Nakano K., Park K., Ohta M., Abe R., Oda T., 2015, Effect of Workload on Driving Performance of Elderly Drivers with Leukoaraiosis, The 22nd ITS World Congress, 4-9 October, Bordeaux, France.