

# Visual Behavior Analysis of Elderly Drivers at Crossing with Bad Visibility

Hiroki Nakamura <sup>1)</sup> Genya Abe <sup>1)</sup> Yohei Iwashita <sup>2)3)</sup>

1) Japan Automobile Research Institute  
2530 Karima, Tukuba, 305-0822, Japan (E-mail: hnakamura@jari.or.jp)

2) Mazda Motor Corporation  
3-2-5, Kasumigaseki, Chiyoda, Tokyo, 100-6025, Japan

3) Japan Automobile Manufacturers Association  
1-1-30 Daimon, Minato-ku, 105-0012, Japan

**KEY WORDS:** Elderly drivers, Visibility, Cognitive reaction time, Gaze behavior [C2]

The reduction of accidents caused by elderly drivers is a priority subject to achieve safe traffic in Japan. It is concerned that visual cognitive deterioration affects the driving behavior of an elderly driver and accidents occur, and in terms of traffic situation, car to bicycle accidents at crossing with bad visibility have been occurred frequently. To reduce such accidents caused by elderly drivers, this study aims on the visual behavior analysis of elderly drivers at crossing with bad visibility through driving simulator experiment; car to bike crossing collision risk is regenerated and visual behaviors of the elderly drivers are analyzed by comparing with those of expert drivers. Particularly, influence of several traffic participants and brightness of dusk are taken into consideration.



Fig.1 Observed condition; crossing with bad visibility under dusk

To understand the correlation between cognitive deterioration affect and driving behavior, elderly drivers are categorized by the result of trail making test, which is a neuropsychological test of visual attention and task switching: TMT fast and TMT slow

As a result, distinctive visual features of elderly drivers are inferred.

1) Recognition time of elderly drivers, especially TMT slow group, were slower than expert drivers, and the difference were more significant in the higher cognitive load conditions: dusk and more traffic participants.

2) Also, gaze direction of elderly driver is inclined toward other traffic participants and horizontal vision range became narrow. The trend was more conspicuous in elderly TMT slow group.

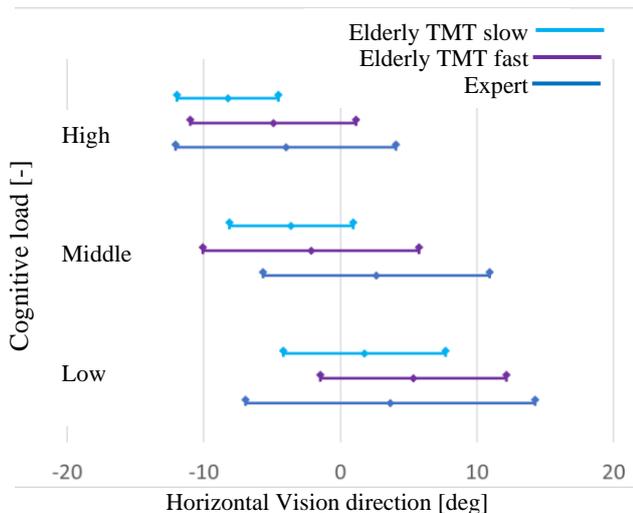


Fig.2 Average and deviation of vision direction of last 3 seconds before the bicycle rushes from the right (other traffic participants are travelling on the left)

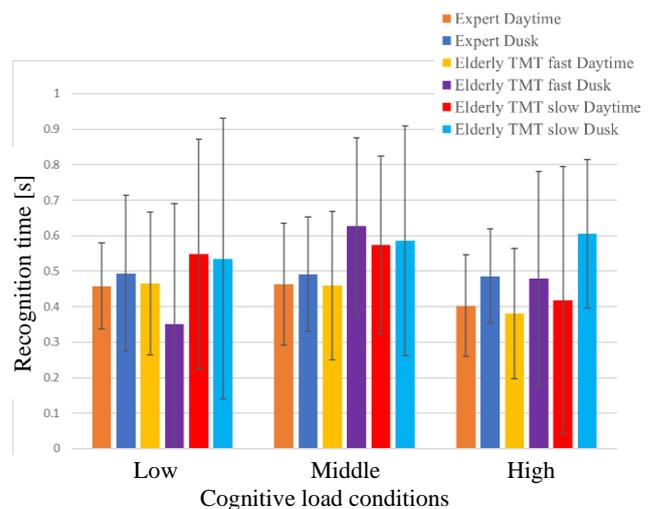


Fig.3 Gaze time delay against bicycle from its appearance