

Transmitted by the expert from Japan

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agenda item 7(f))

Research on Daytime Running Lamps of 4-wheeled Vehicles

Expert from JAPAN

Background of **DRLs** in Japan

Permanent lighting of motorcycle headlamps mandatory since 1996



Effective in reducing motorcycle accidents

- * Concern for DRL glare to drivers
- * Concern for reduced conspicuity of motorcycles in front of 4-wheeled vehicles



Currently, Japan does not allow DRLs for 4-wheeled vehicles.

Research Purpose

To verify the effects of DRLs on road traffic in Japan

The effects of a 4-wheeled vehicle with the DRL on were studied from the following perspectives:

- (1) Right-turn behavior of the oncoming vehicle's driver
- (2) DRL glare given to the oncoming vehicle's driver
- (3) Conspicuity of a motorcycle in front of the 4-wheeled vehicle with the DRL on
- (4) Pedestrians' road-crossing behavior

Test Conditions

Items		Conditions
Sky illuminance		Day (10,000 lx or above) Dusk (2,000 lx, 1,000 lx) Night (0 lx)
Lamp type (mounting height)	Test vehicle	Passing beam: HID, originally installed (775 mm) Daytime Running Lamp(DRL): LED (620 mm)
	Motorcycle	Passing beam: HID, originally installed (895 mm)
Vehicle speed		60 km/h
Test subjects		20 persons (8 males, 12 females, aged 22 - 48, ordinary driver license holders)
Eye-point height of test subjects		1,200 mm



Test Parameter: sky illuminance



Test Parameter: DRL intensity

Tests conducted at dusk (1,000 lx)



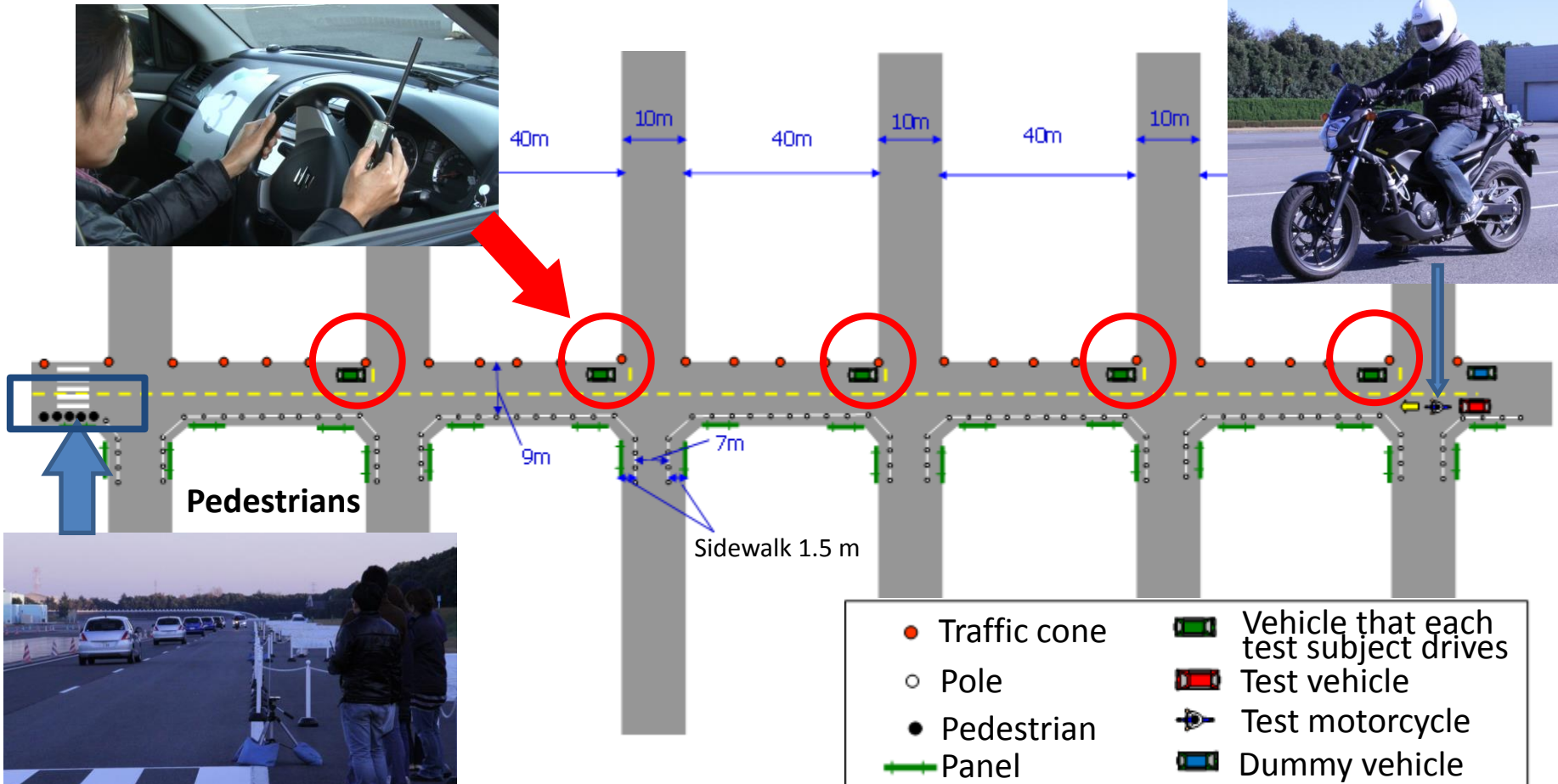
Test Setup

At 6 simulated intersections, measurements were taken simultaneously from 5 test subjects and 5 pedestrians.

Test subject & response switch

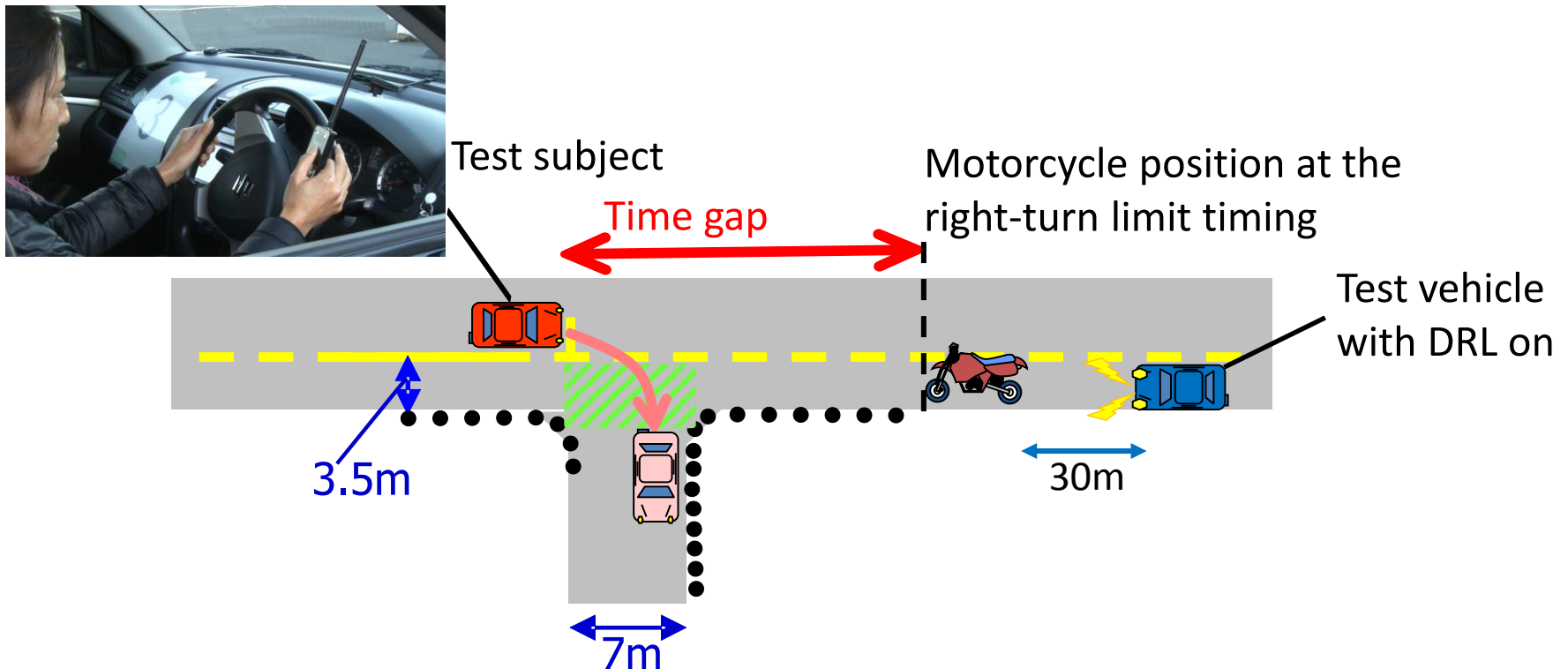


Test motorcycle



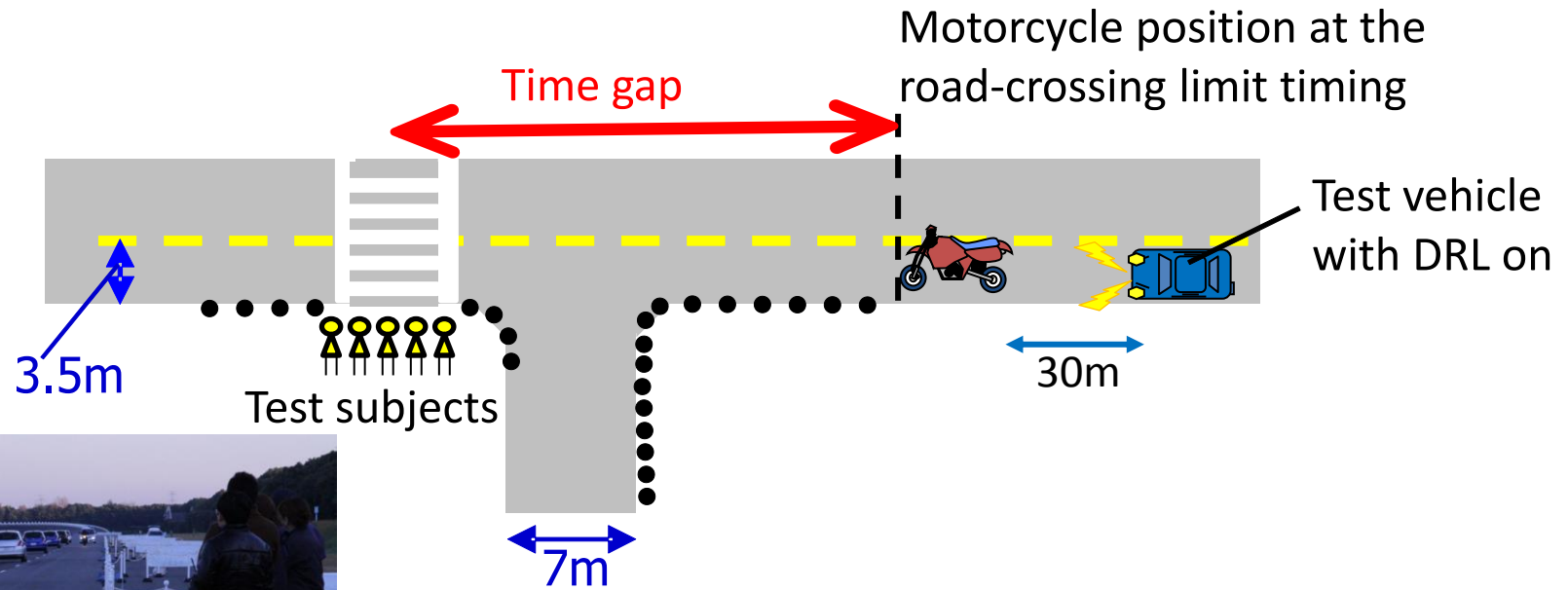
Outline of Experiment (Drivers)

- * The situation where the driver turns right was reproduced at a simulated intersection.
- * The timing where each driver decides not to turn right if the motorcycle approaches any closer (1. right-turn limit timing) was measured.
- * In addition, 2. DRL glare and 3. motorcycle conspicuity were also measured and evaluated.

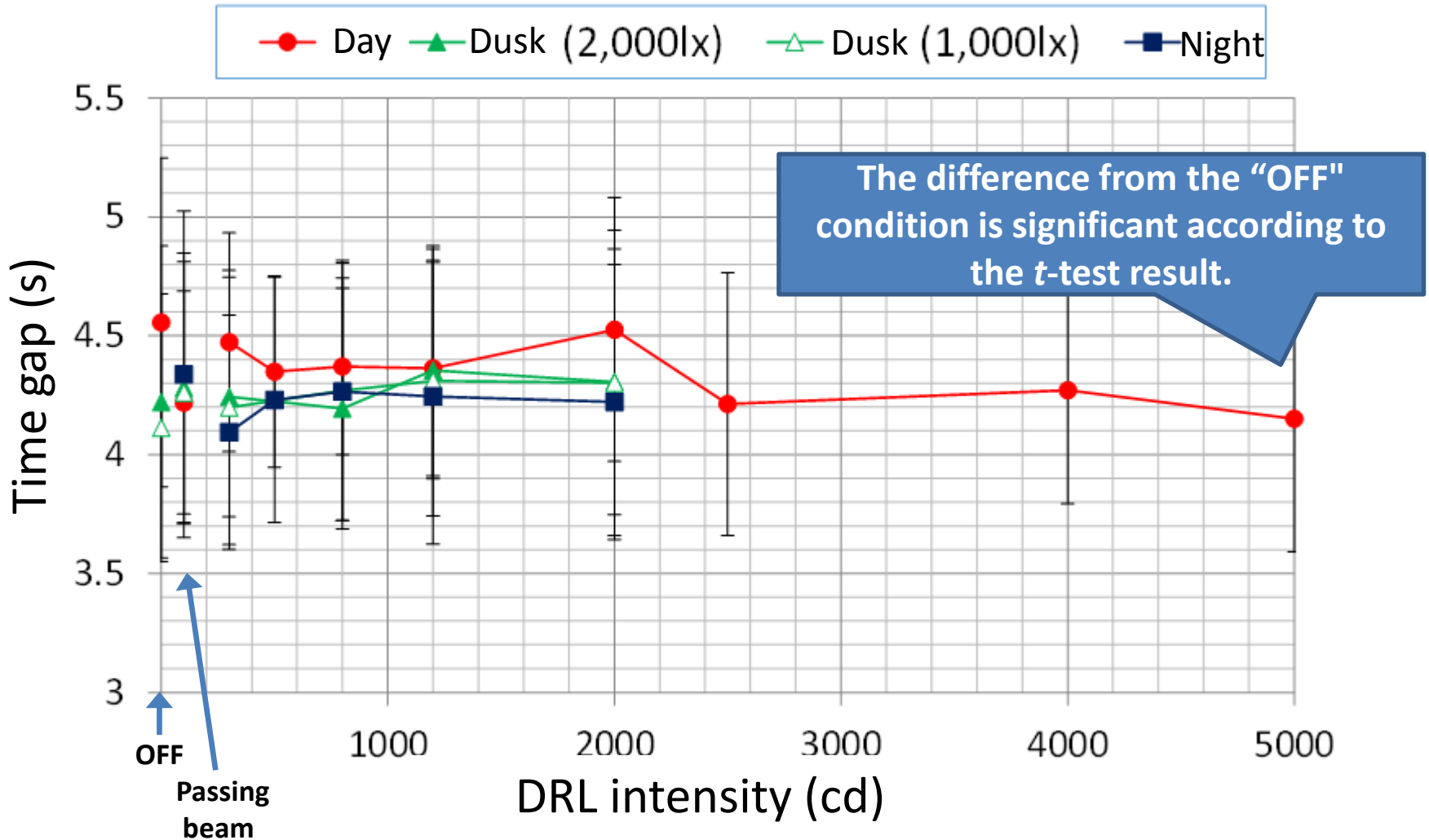


Outline of Experiment (Pedestrians)

- * The situation where pedestrians are about to cross the road was reproduced in front of the crosswalk at a simulated intersection.
- * The timing where each pedestrian decides not to cross the road if the motorcycle approaches any closer (4. road-crossing limit timing) was measured.

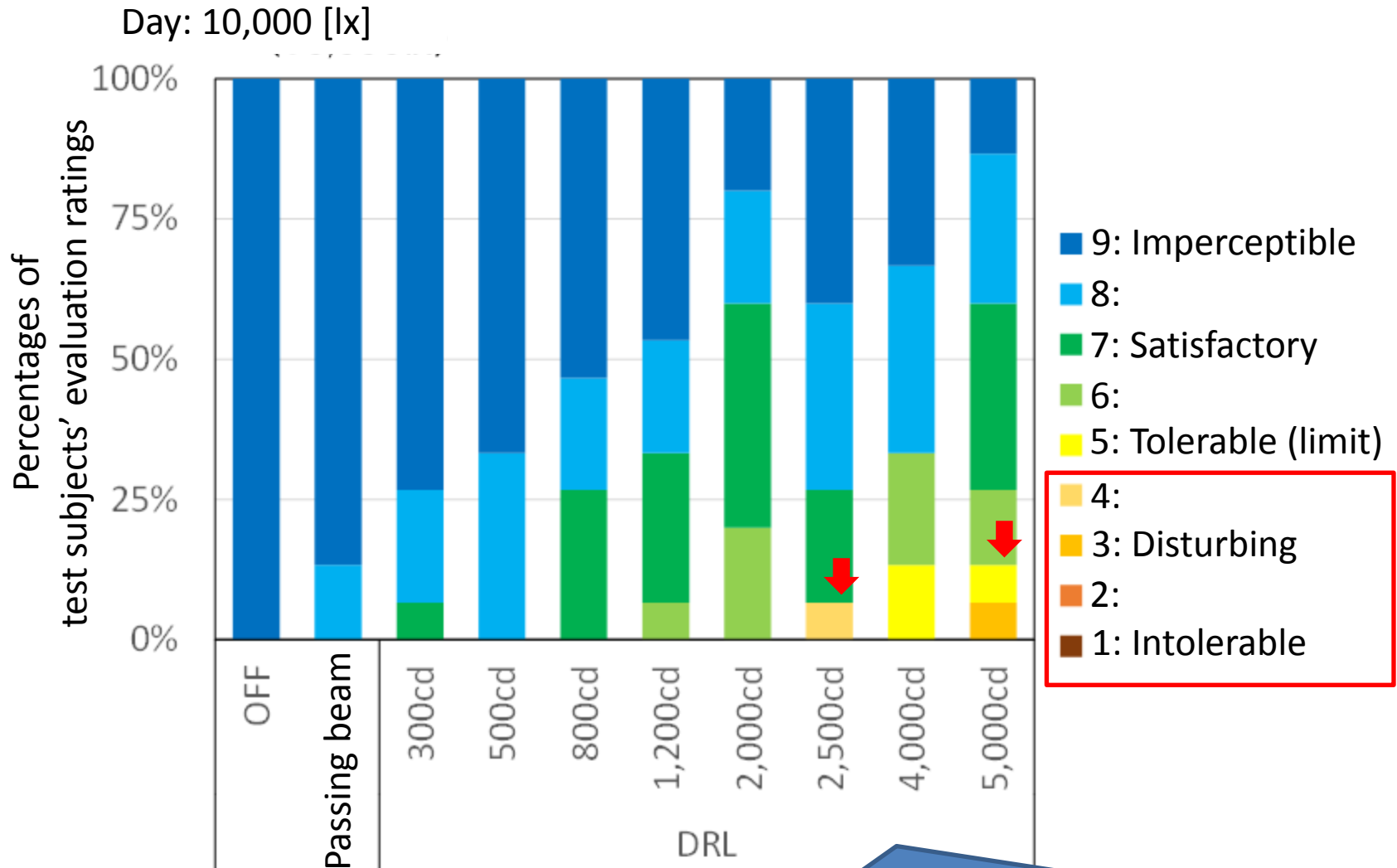


(1) Results: Time gap toward two-wheeled vehicle



* Except for the "Day, 5,000 cd" condition, no particular effect of the DRL on the test subject's right-turn behavior was observed.

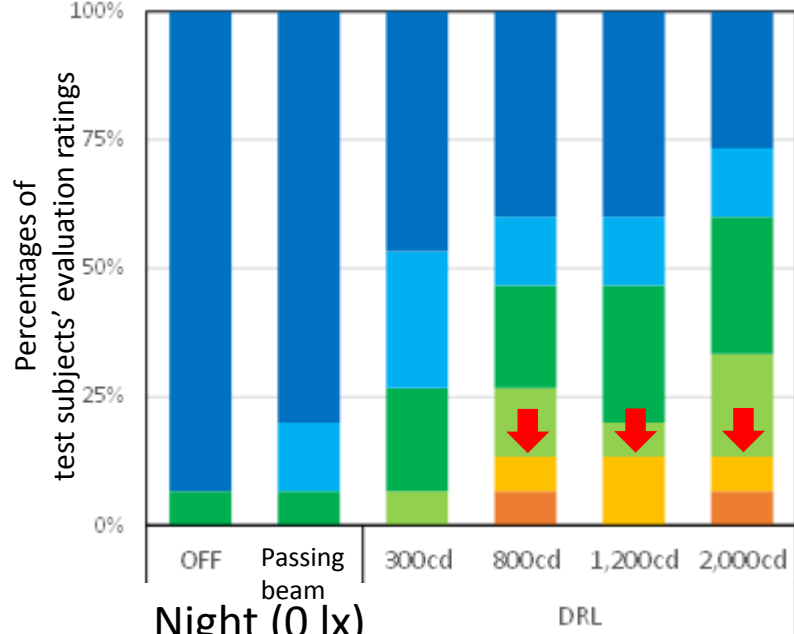
(2) Results: Evaluation of glare from DRL



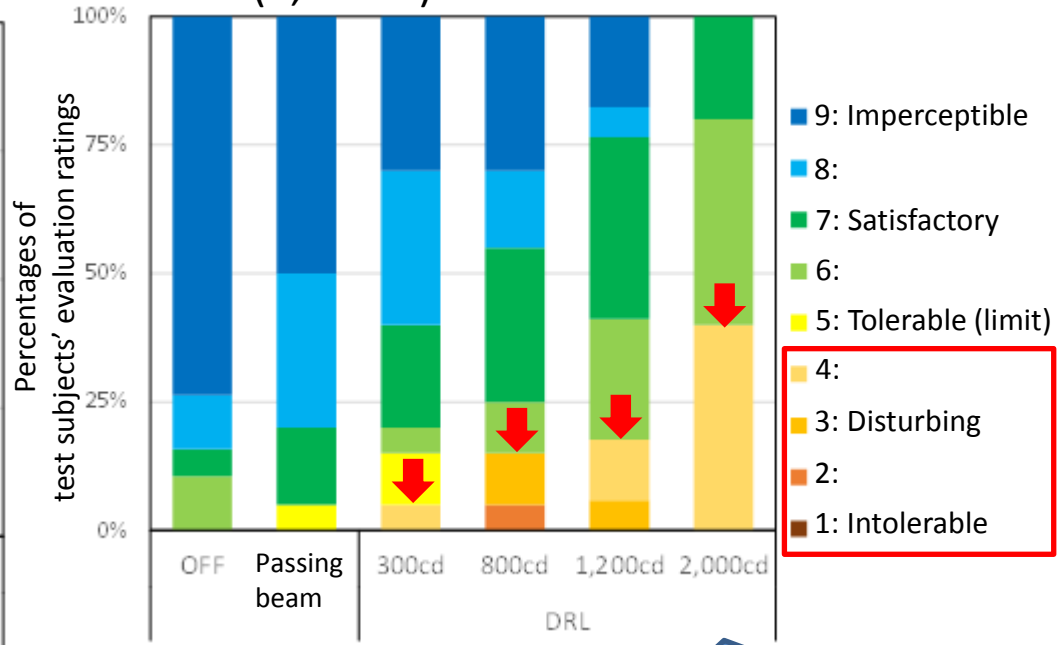
Under the "Day (10,000 lx or above)" condition, the evaluation rating 4 or below was rarely given even for the DRL intensity of 5,000 cd.

(2) Results: Evaluation of glare from DRL

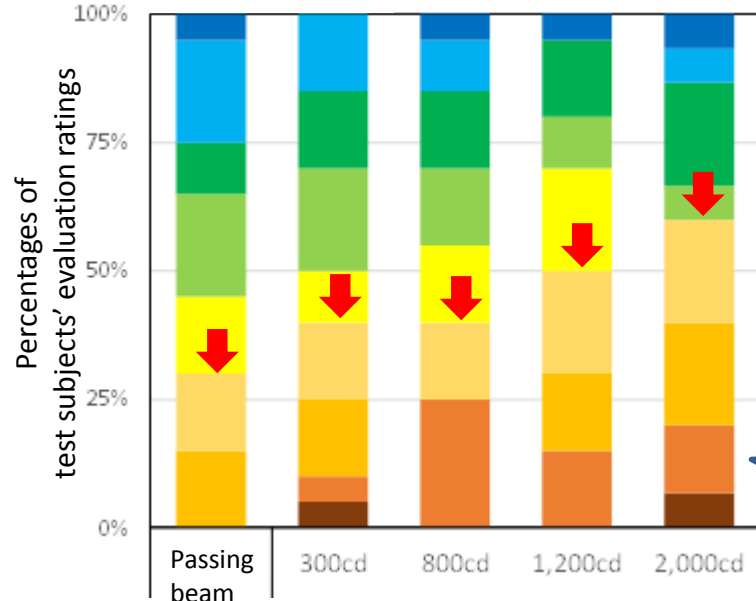
Dusk (2,000 lx)



Dusk (1,000 lx)



Night (0 lx)

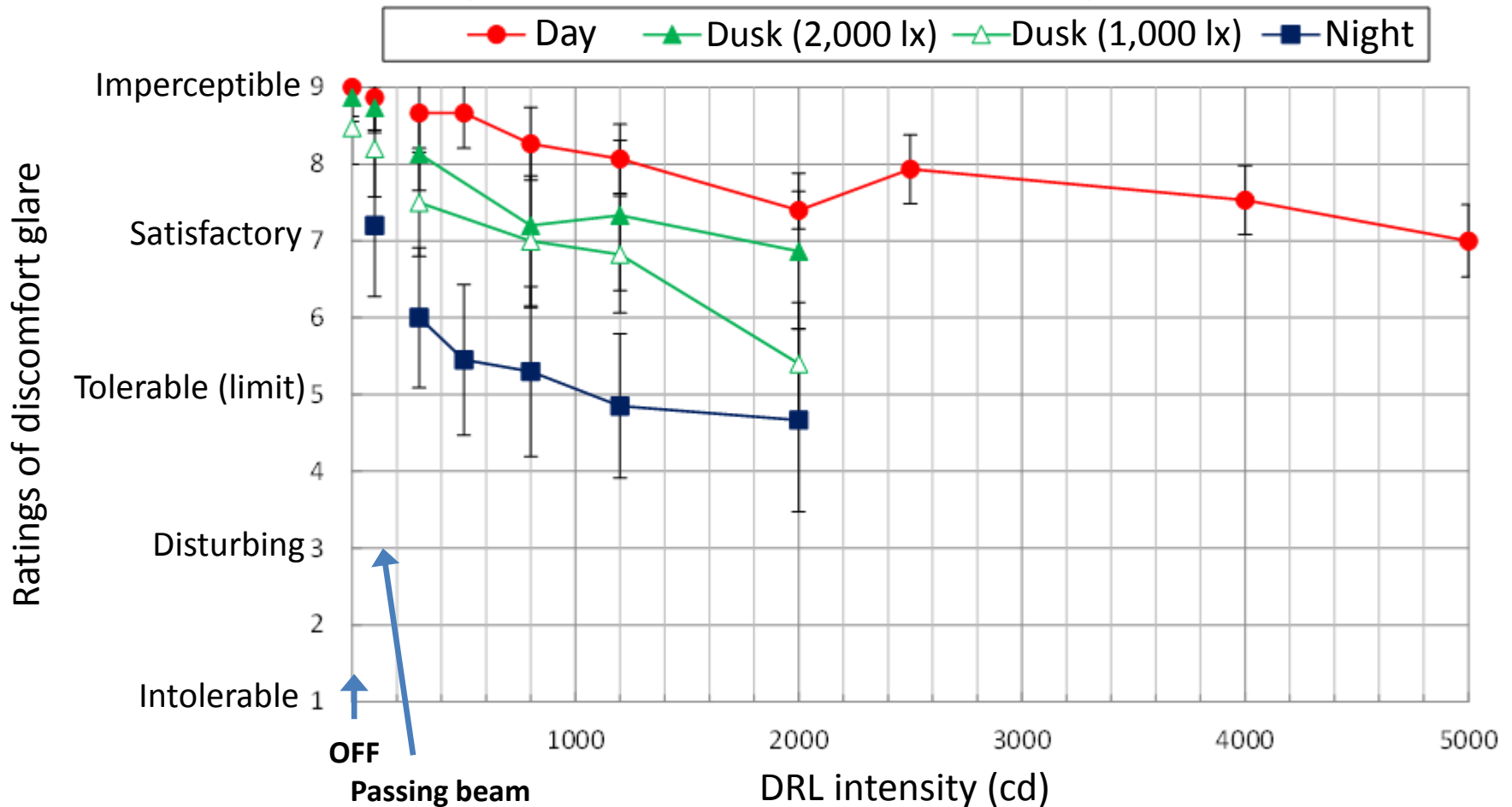


Under the "Dusk (1,000 lx)" condition, the evaluation rating 4 or below was given by 25% or more of the test subjects for the DRL intensity of 2,000 cd.

Under the "Night" condition, the DRL caused more glare than the headlamp.

(2) Results: Evaluation of glare from DRL

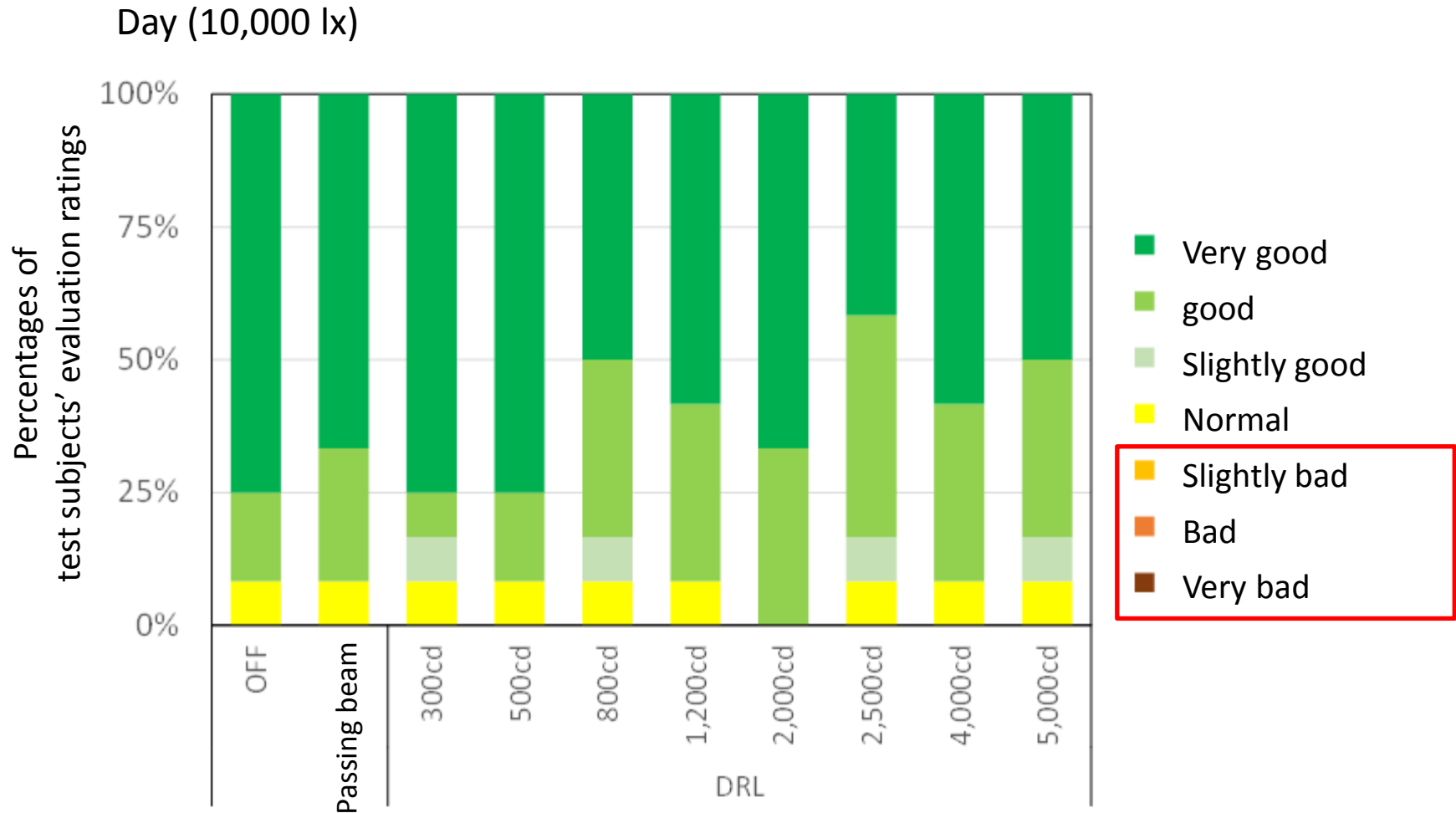
Weighted means for all test subjects



* The evaluation rating tended to decline as the DRL intensity increased.

* Under the "Dusk (1,000 lx)" condition, the evaluation rating for the DRL intensity of 2,000 cd was around "5: Tolerable (limit)".

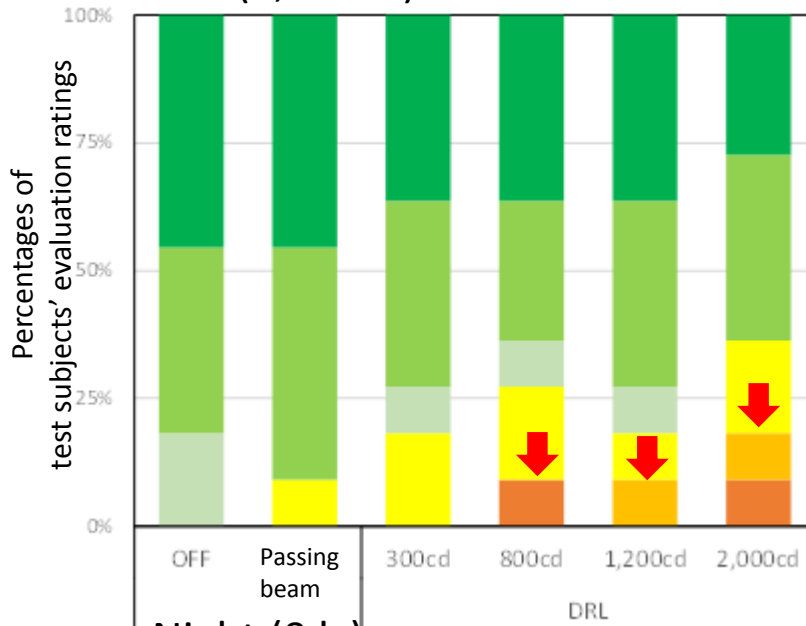
(3) Results: Conspicuity of two wheeled vehicle



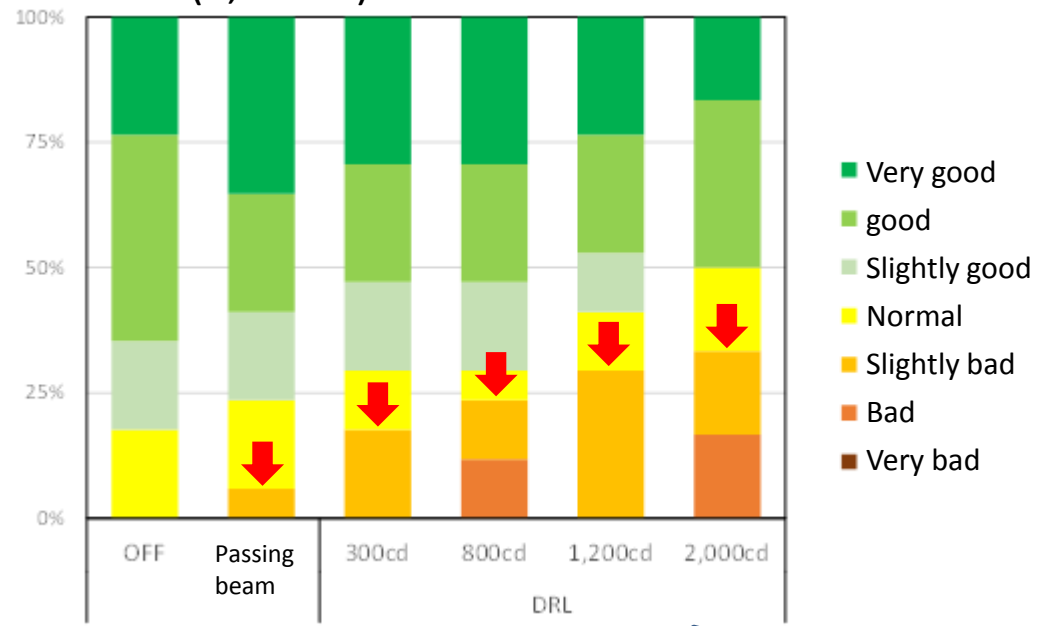
Under the "Day (10,000 lx)" condition, the DRL, regardless of its intensity, had almost no effect on the motorcycle conspicuity.

(3) Results: Conspicuity of two wheeled vehicle

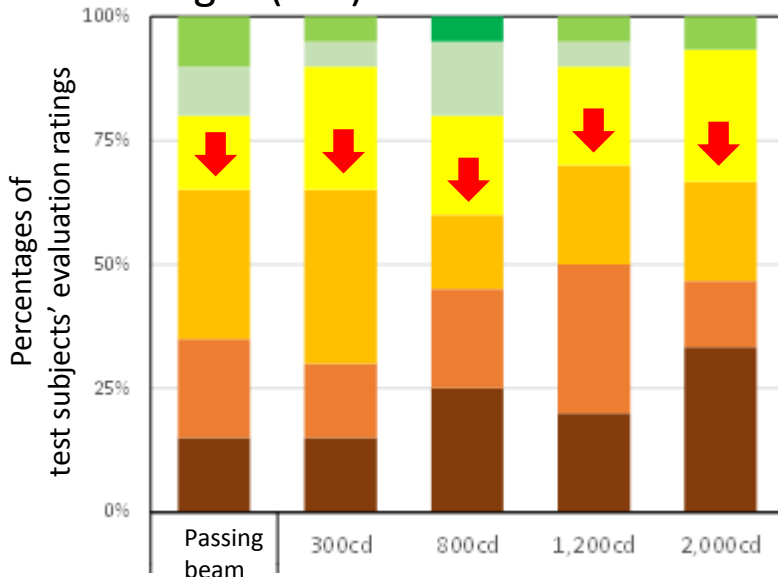
Dusk (2,000 lx)



Dusk (1,000 lx)



Night (0 lx)

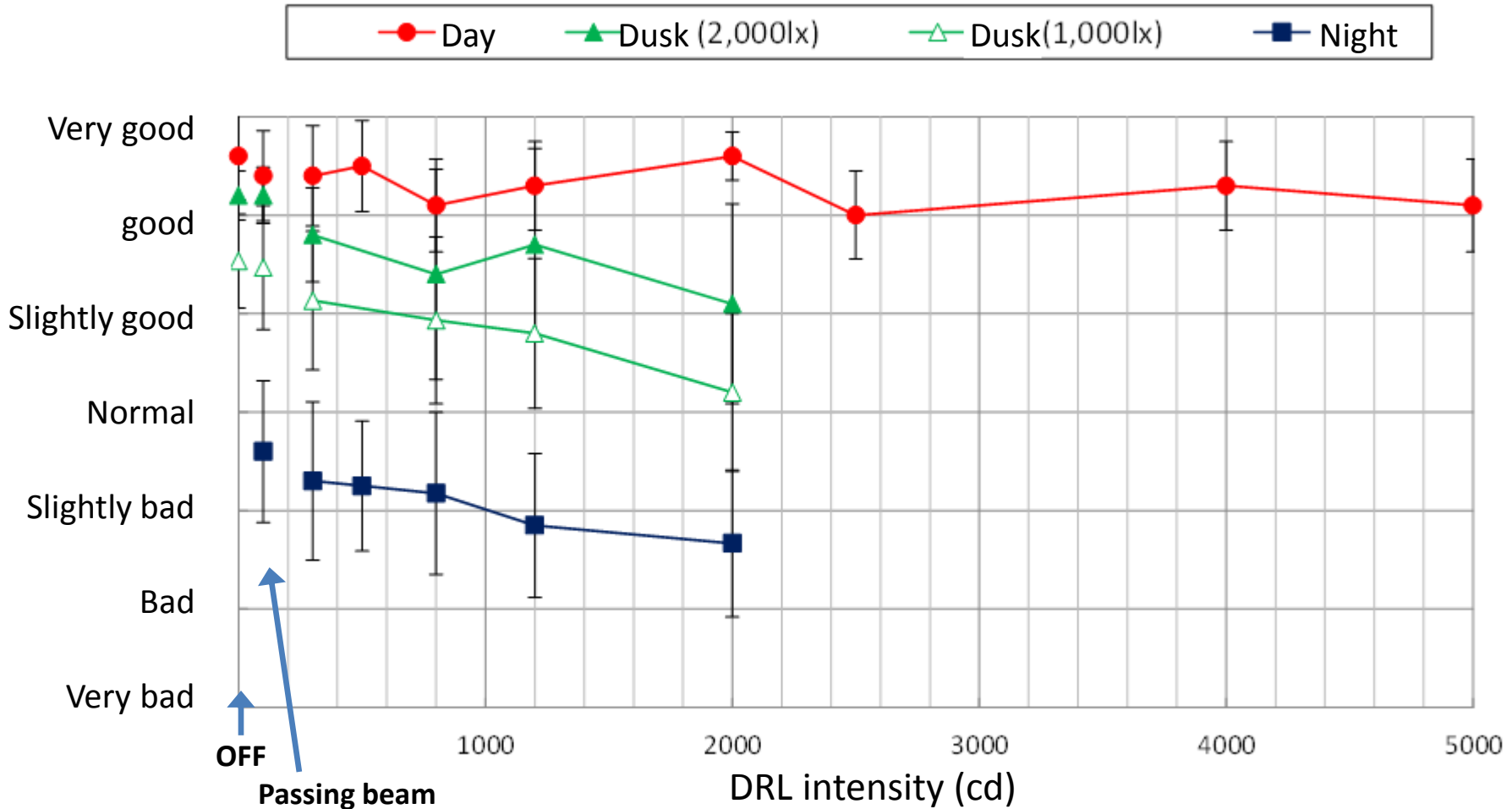


Under the "Dusk (1,000 lx)" condition, the evaluation "Somewhat difficult to see", "Difficult to see" or "Very difficult to see" was given by about 30% of the test subjects for the DRL intensity of 1,200 cd.

Under the "Night (0 lx)" condition, the motorcycle conspicuity decreased with or without the DRL.

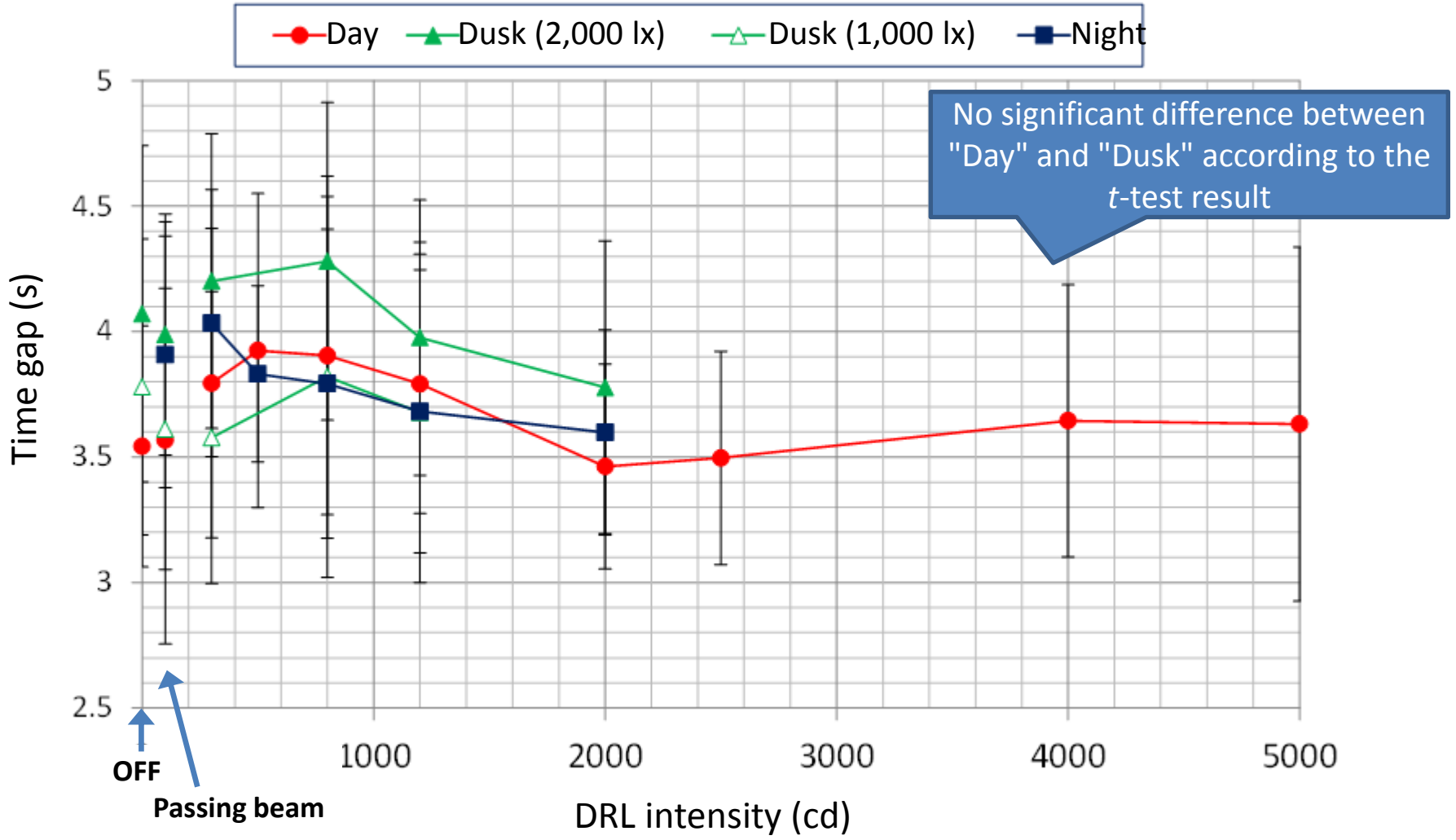
(3) Results: Conspicuity of two wheeled vehicle

Weighted means for all test subjects



* Under the "Day" condition, the evaluation rating tends to remain almost unchanged regardless of the DRL intensity.
* Under the "Dusk" and "Night" conditions, the evaluation rating tended to decline as the DRL intensity increased; under the "Dusk (1,000 lx)" condition, the mean rating from all test subjects for the DRL intensity of 2,000 cd was around "Normal".

(4) Results: Time gap between pedestrian and two-wheeled vehicle



* Overall, the time gap tended to decrease as the DRL intensity increased.
 * On the other hand, the *t*-test result indicates that, under the "Day" and "Dusk" conditions, the trailing vehicle's DRL did not affect the road-crossing judgment involving the motorcycle.

Summary

(1) Time gap in the driver's right-turn behavior

- * Under the "Day (10,000 lx)" condition, there was a significant difference from the "headlamp OFF" condition when the DRL intensity was 5,000 cd.
- * Under the other conditions, no effect of the DRL was found.

(2) Evaluation of DRL glare

- * The evaluation rating tended to decline, i.e., more glare was generated, as the DRL intensity increased.
- * Under the "Dusk (1,000 lx)" condition, the mean rating from all test subjects for the DRL intensity of 2,000 cd was around "5: Tolerable (limit)".

(3) Effect of the DRL on motorcycle conspicuity

- * Under the "Day (10,000 lx)" condition, the DRL had almost no effect on the motorcycle conspicuity regardless of its intensity.
- * Under the "Dusk" and "Night" conditions, the evaluation rating tended to decline as the DRL intensity increased; under the "Dusk (1,000 lx)" condition, the mean rating from all test subjects for the DRL intensity of 2,000 cd was around "Normal".

(4) Time gap in pedestrians' road-crossing behavior

- * Although, overall, the time gap tended to decrease as the DRL intensity increased, the *t*-test result indicates no effect of the DRL's lighting under the "Day" and "Dusk" conditions.

Thank you for your attention !