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Safety Effects of “Automatic Headlamps on” on Two-wheeled Vehicles in Japan

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**Lighting and Light-signalling Devices Subcommittee
JASIC**

Background and Purpose

Background

To improve the visibility of two-wheeled vehicles by other road users, Japan has introduced since 1991 daytime headlamps on system, whereby automatically the headlamp is lit on such vehicles in daytime and made it compulsory by legislation in 1997.

The percentage of such two-wheeled vehicles with a built-in AHO (automatic headlamps on) system to the total number of two-wheeled vehicles in Japan increased from year to year to exceed 60% in 2000. This made it possible to verify the effect of the AHO system on two-wheeled vehicles on the reduction of accidents using traffic accident statistics.

Purpose

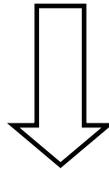
The purpose of this report is to verify the effects of AHO system on two-wheeled vehicles on the reduction of traffic accidents in Japan.

Conditions

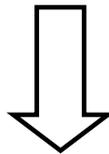
- The analysis will cover all the accidents resulting in injury or death involving all motorcycles reported between 1990 and 2000.
- The analysis will examine statistics classified by accident type, by daytime or nighttime type, by time zone, and by number of vehicles involved.
- In the analysis, the rate of use of automatic headlamps on is defined as the rate of number of two-wheeled vehicles with a built-in AHO system, not including those vehicles of which the driver lights up the headlamp by him/herself.

Analysis Steps

Review the accidents of two-wheeled vehicles as a whole to identify their characteristics.



Find analysis patterns showing significant tendencies



Carry out in-depth analysis on such patterns to verify the safety effects of the AHO system

General Tendencies in Three Time Zones

Number of accidents compared between three time zones

Between daytime, nighttime and twilight, there isn't any significant difference in number of accidents by time zone.

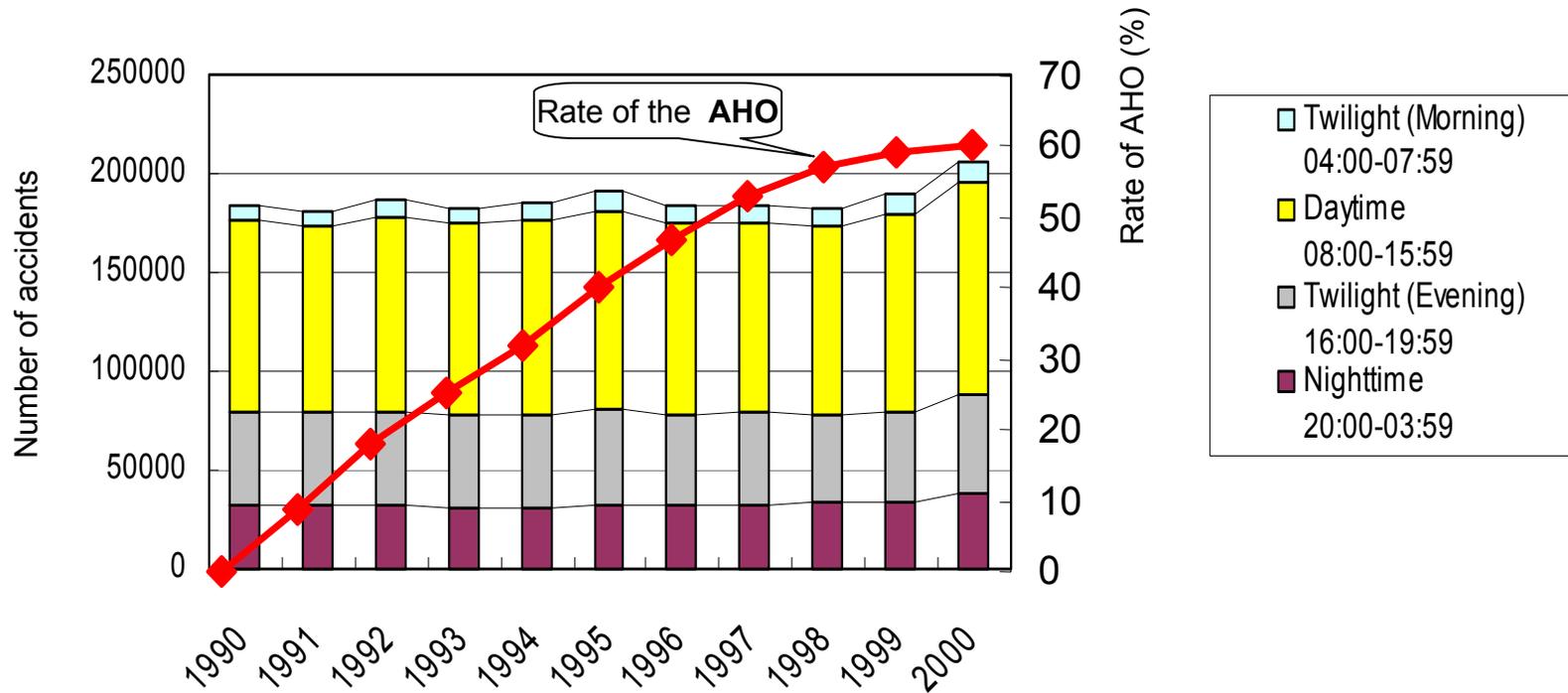


Fig. 1 All accident types combined

General Tendencies

Daytime and Twilight (Evening) / Nighttime

Daytime accidents / Nighttime accidents; Twilight (Evening) accidents / Nighttime accidents

Since the effects of AHO don't concern the accidents at night and there wasn't any change factor in the number of night accidents between 1990 and 2000, we took the number of night accidents as basis of comparison to look up how the number of daytime accidents and twilight accidents has changed. Although the graph shows a certain tendency toward reduced number of accidents as the rate of AHO increases, it cannot be qualified statistically significant, because it only shows a very low correlation in daytime accidents.

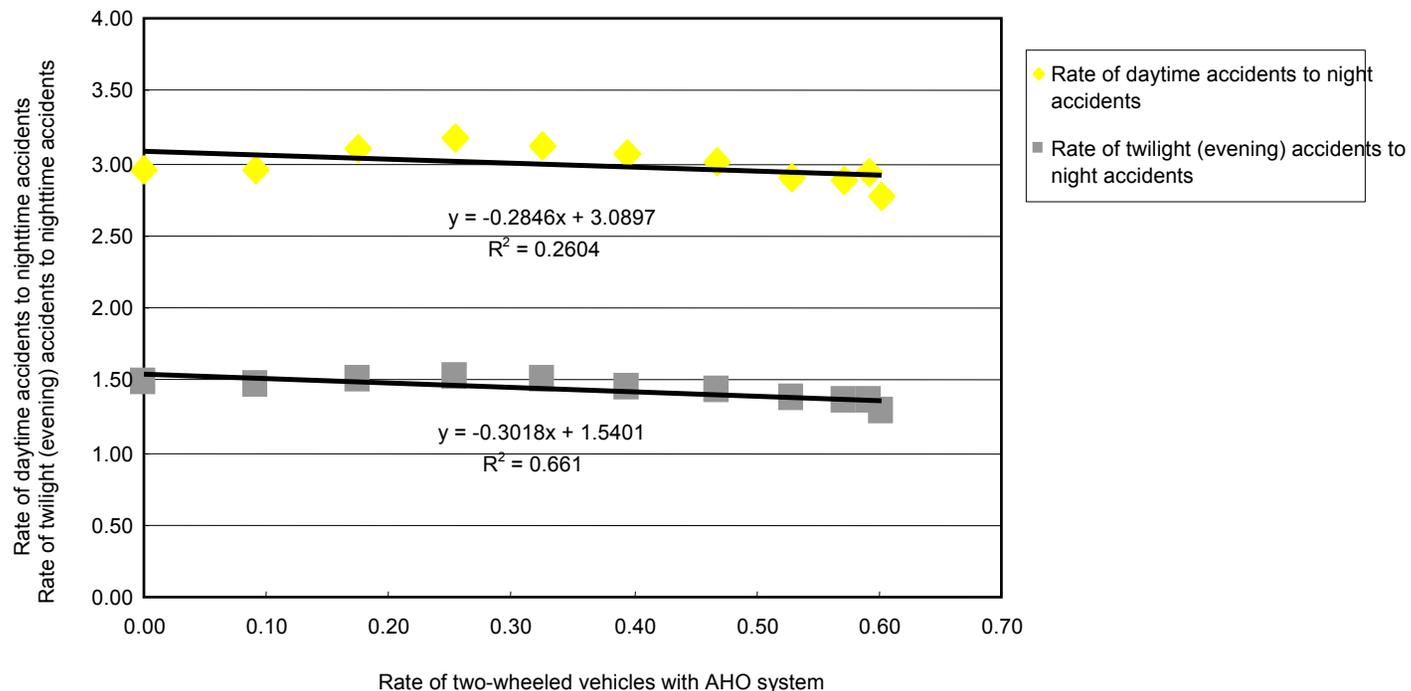


Fig. 2 All accident types combined
(daytime and twilight (evening) accidents /night accidents)

Note: Twilight accidents (morning) are not covered by this analysis because there are not many accidents.

General Tendencies

Daytime and Twilight (Evening) Accidents / Night Accidents by Primary Party

Daytime Accidents / Night Accidents by Primary Party; Twilight (Evening) Accidents / Night Accidents by Primary Party

When examined alone, primary party accidents don't show any correlation for daytime accidents, while showing just a very slight correlation for twilight (evening) accidents with a slight reduction in the number of accidents.

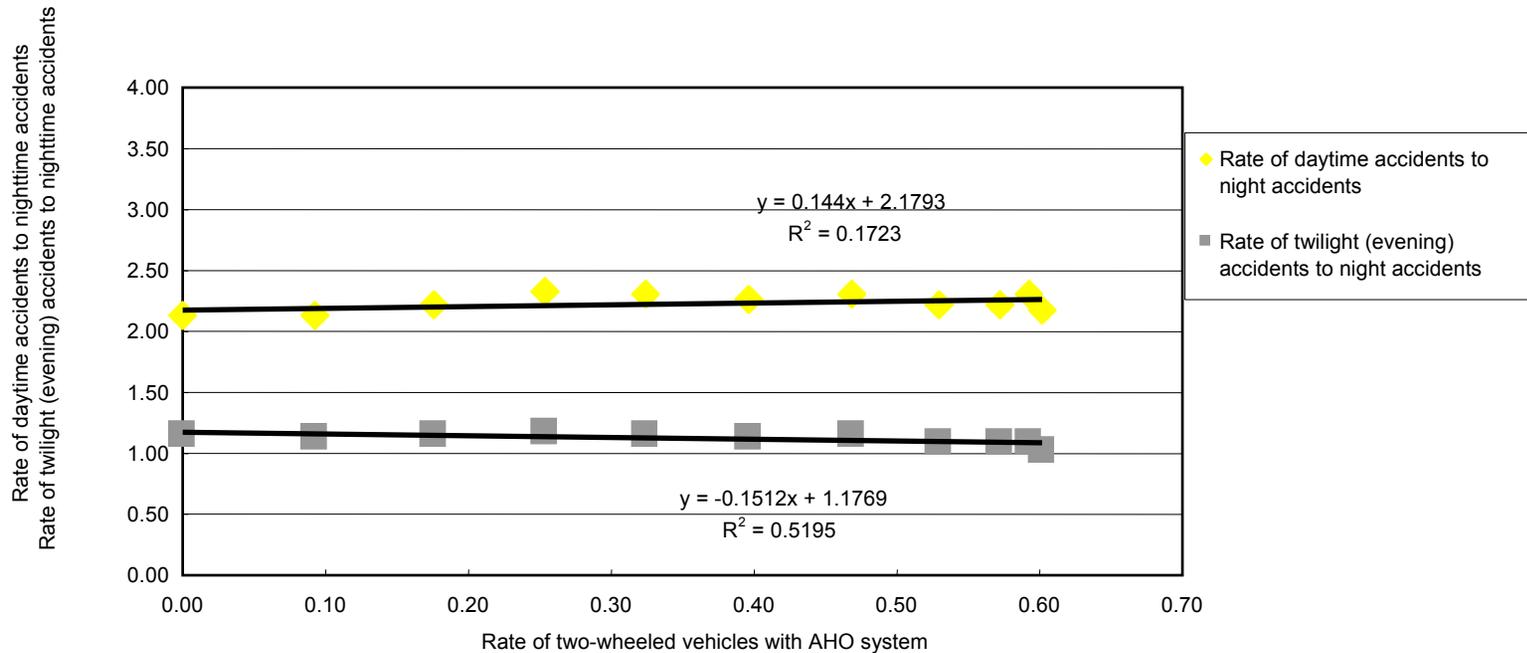


Fig.3 All accident types combined (daytime and twilight (evening) accidents / night accidents) by primary party

- Note 1: Twilight accidents (morning) are not covered by this analysis because there are not many accidents.**
Note 2: Primary party: Fault larger than the other; Secondary party: Fault none or smaller than the other

General Tendency

Daytime and Twilight (Evening) Accidents / Night Accidents by Secondary Party

Daytime Accidents / Night Accidents by Secondary Party; Twilight (Evening) Accidents / Night Accidents by Secondary Party

When examined alone, secondary party accidents show a high correlation for twilight (evening) accidents, while showing also a certain correlation for daytime accidents. This indicates that as the rate of **AHO** increases, accidents reduce both in the daytime and in the twilight.

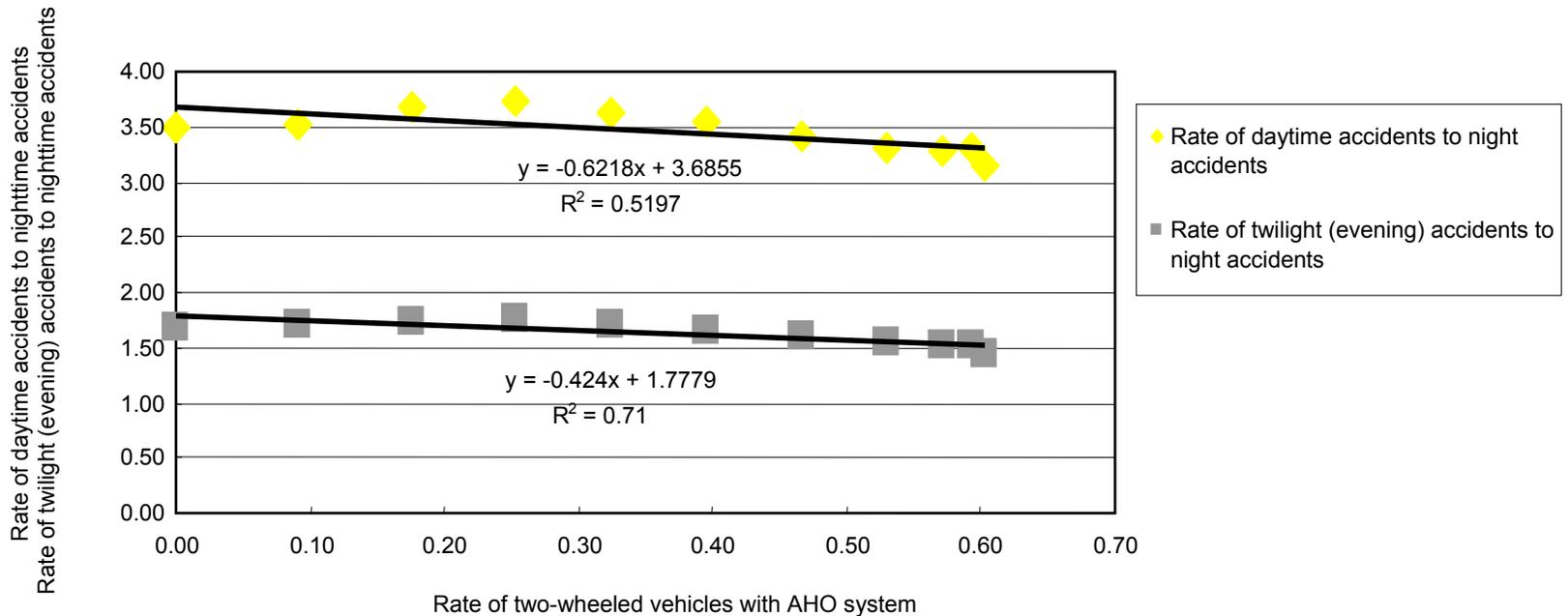


Fig.4 All all accident types combined
(daytime and twilight (evening)/night) by secondary party

Note 1: Twilight accidents (morning) are not covered by this analysis because there are not many accidents.

Note 2: Primary party: Fault larger than the other; Secondary party: Fault none or smaller than the other

Tendencies by Specific Type of Accidents

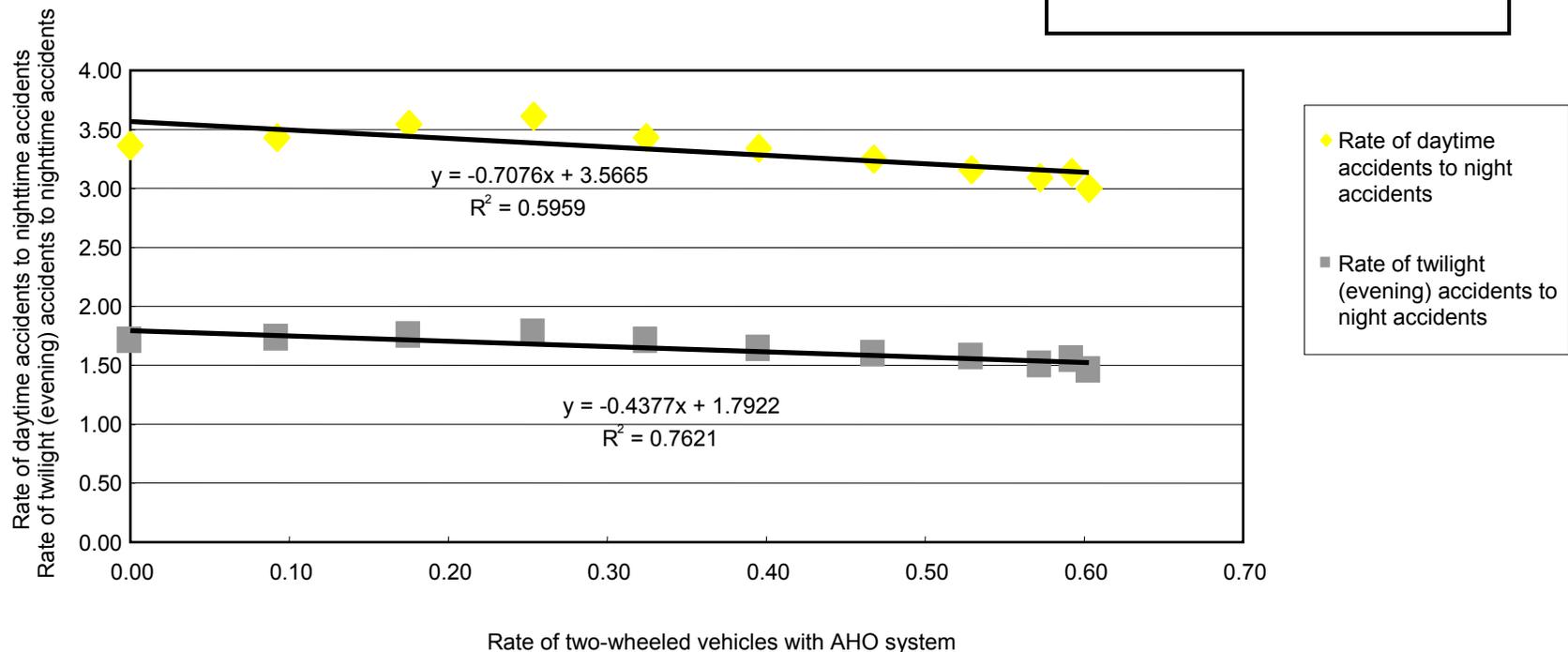
Daytime and Twilight (Evening) Accidents / Night Accidents by Secondary Party

Specific types of accidents combined - Daytime accidents / Nighttime accidents; Twilight (evening) accidents / nighttime accidents

The curvilinear graph shows an **even higher correlation** indicating that as the rate of AHO increases, the number of accidents reduces both in the daytime and in the twilight.

Specific types of accidents:

Three forms of accidents:
accidents when turning right,
right-angle collision,
and head-on collision



Rate of two-wheeled vehicles with AHO system
Fig.5 All accident types combined by secondary party
Daytime and Twilight (Evening) / Night

Note 1: Twilight accidents (morning) are not covered by this analysis because there are not many accidents.

Note 2: Primary party: Fault larger than the other; Secondary party: Fault none or smaller than the other

Effects on Reduction of Accidents

On three specific types of accidents by secondary party (which covers over 40% of all accidents involving two-wheeled vehicles):

We calculated from Fig.5 the daytime/nighttime ratio in 1990 (when the rate of AHO was zero) and in 2000 (when the rate of AHO was 60%) respectively and **tentatively calculated the number of daytime accidents**

...and defined the difference between the values obtained above as number of accidents avoided thanks to the introduction of AHO.

For twilight accidents also, we tentatively calculated the number of accidents in the twilight in the same way as above.

	In 2000	
Number of nighttime accidents	18,856	
Daytime/Nighttime	3.57	3.14
Number of daytime accidents	67,316	59,208
Estimated effects on reduction	8,108 accidents avoided	

	In 2000	
Number of nighttime accidents	18,856	
Twilight/Nighttime	1.79	1.53
Number of twilight accidents	33,752	28,850
Estimated effects on reduction	4,902 accidents avoided	

Analysis of Two-wheeled Vehicle Accident Statistics: Results

- The general tendency of all accidents combined shows a correlation between the increase of two-wheeled vehicles with a built-in AHO system and the reduction in the number of accidents in the twilight, indicating that, as such two-wheeled vehicles increased, the number of motorcycle accidents reduced.
- The general tendency of all accidents by secondary party shows an even higher correlation for twilight accidents, while showing a certain correlation for daytime accidents, indicating that the accidents of two-wheeled vehicle definitely reduced.
- Specific types of accidents (accidents when turning right, head-on collision, and right-angle collision by secondary party), which covers more than 40% of all motorcycle accidents, show an even higher correlation, indicating that an obvious reduction of two-wheeled vehicle accidents both in the daytime and in the twilight.

Conclusion

- The effects of the introduction of AHO system on two-wheeled vehicles on the reduction of accidents are obvious.
- Based on the accident statistics in Japan in 2000, we would be able to estimate that the introduction of AHO system on two-wheeled vehicles would avoid about 13,000 accidents a year compared to 1990 level. We therefore strongly recommend the urgent legislation in member countries for the introduction of AHO on two-wheeled vehicles.

Note: In Japan, an AHO system for four-wheeled vehicles has not been introduced.

Reference

Number of Two-wheeled Vehicles by Country

(In thousands)

