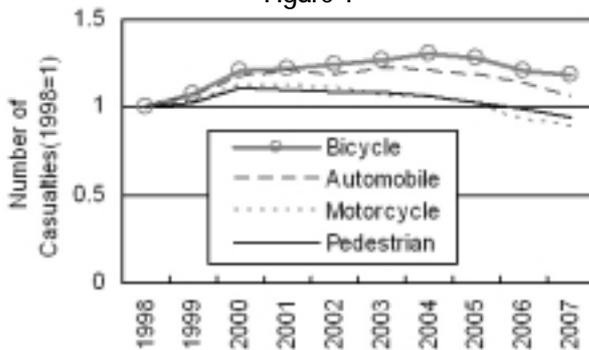# Bicycle Traffic Accidents in Japan

- Influence of passengers and cyclists' manner on the accidents occurrence -

Shinichi Yoshida
Japan, Institute for Traffic Accident Research and Data Analysis
e-mail:yoshida@itarda.or.jp

1. Number of Casualties in Comparison between Types of Road Users
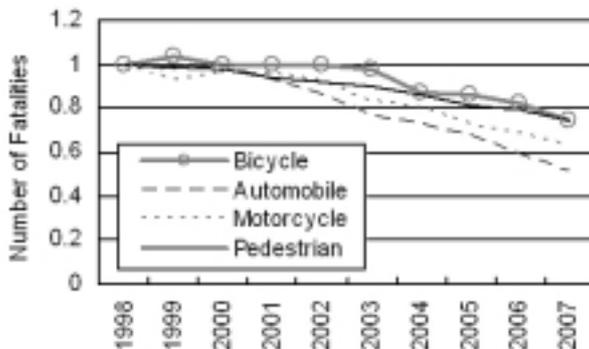

Figure 1

Change of the number of casualties, in the ratio to the number of 1998.

Figure1 shows that automobile and bicycle are very slow in decrease compared with motorcycle and pedestrian, and stays above 1.0 even in 2007.

It reflects the increase of the number of driver license holders or bicycle users.
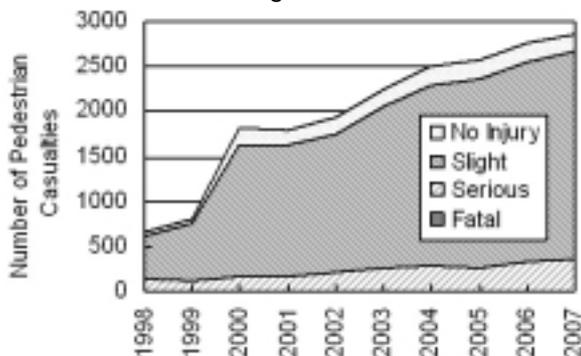

Figure 2

Change of the number of fatalities, in the ratio to the number of 1998(see figure2).

Every road user has been decreasing rapidly, but again bicycle is the slowest.

Automobile is the fastest, owing to the variety of countermeasures like seat belt, air bag or body structure improvements.

2. Bicycle to Pedestrian Accidents

Figure 3

If we focus on bicycle to pedestrian accidents, we find that the number of pedestrian casualties has been drastically increasing.
Figure3 shows the change of the number of pedestrian casualties by injury level in bicycle to pedestrian accidents.
Compared with other types of accidents, number of pedestrian casualties has been continuously and rapidly increasing.
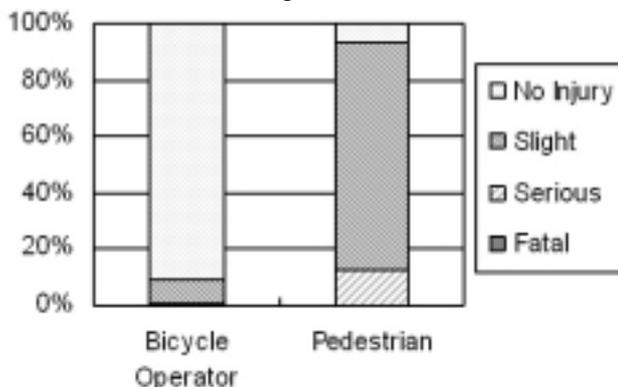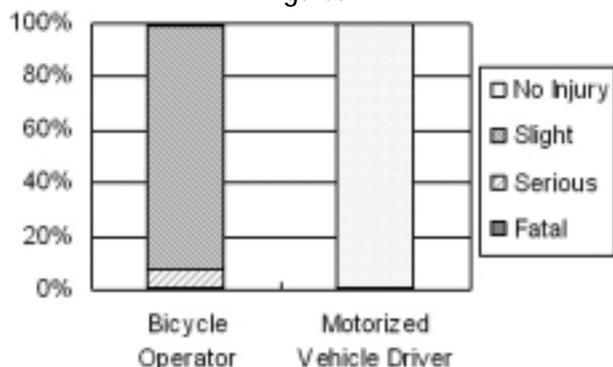
Figure 4

Figure4 shows the injury level in comparison between bicycle operators and pedestrians in bicycle to pedestrian accidents. Casualty Rate[1] is about 10% for bicycle operators and about 94% for pedestrians.

Figure5

It is not necessary to say that in motorized vehicle to bicycle accidents bicycle operators almost alone get injured.
Figure5 shows the comparison of injury level between bicycle operators and motorized vehicle drivers in motorized vehicle to bicycle accidents. Casualty Rate is more than 99% for bicycle operators and about 1% for motorized vehicle drivers.
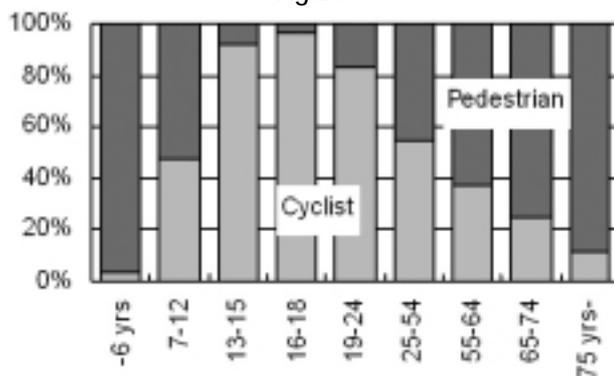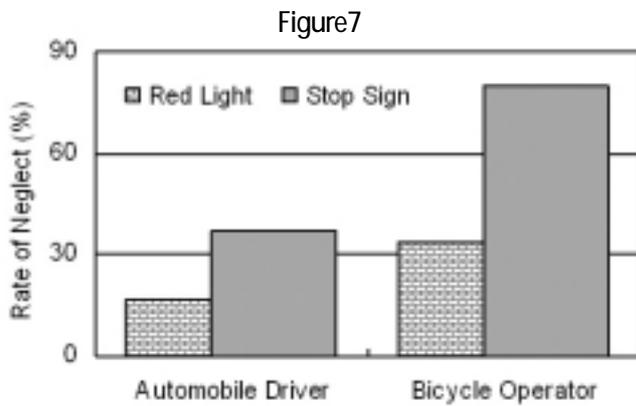
Figure6

Figure6 shows the percentage of those who were involved in bicycle to pedestrian accidents as bicycle operator in each age range. Elderly people and infants are involved mainly as pedestrians, on the other hand people from 13 through 24 years old as cyclists.
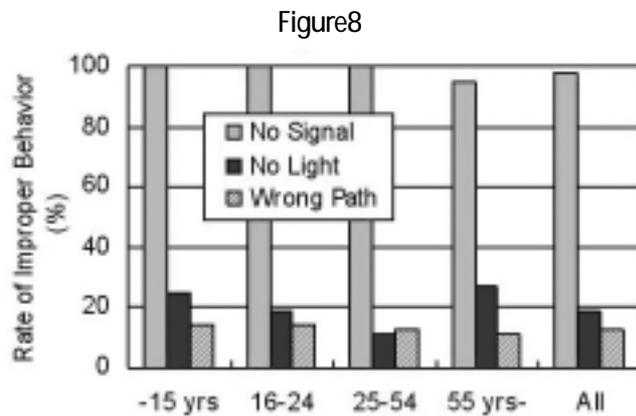Elderly people and infants are the true victims.

*1) Casualty Rate(%) = Number of casualties/Number of operators and drivers involved in the accidents × 100

Poster Presentations

3. Bicycle Operators Cause the Accidents by Their Improper Manner of Cycling

Figure7

We calculated percentage of automobile drivers or bicycle operators who neglected red lights or stop signs where red lights or stop signs were set up.
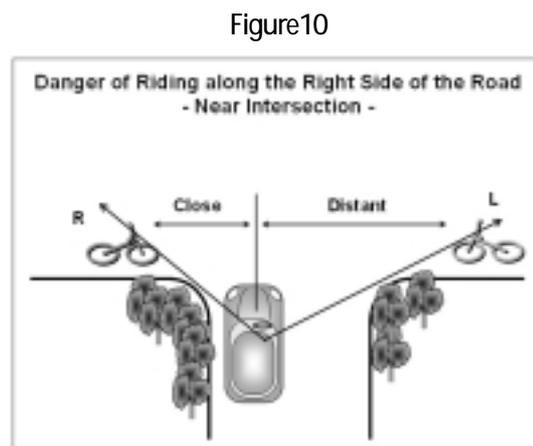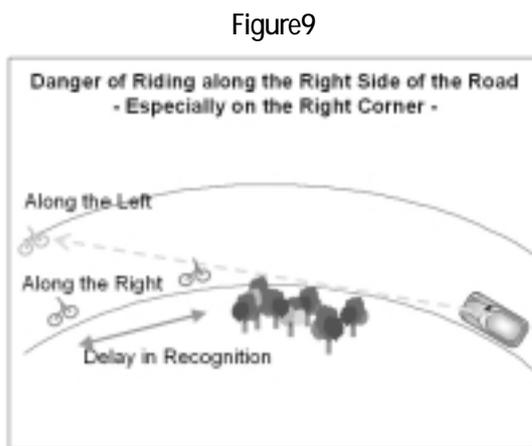
Figure7 shows that bicycle operators neglect red lights or stop sign twice as frequent as automobile drivers do. It means that although cyclists are considered to be victims in the traffic, they are the ones to actually cause the accidents.

Figure8

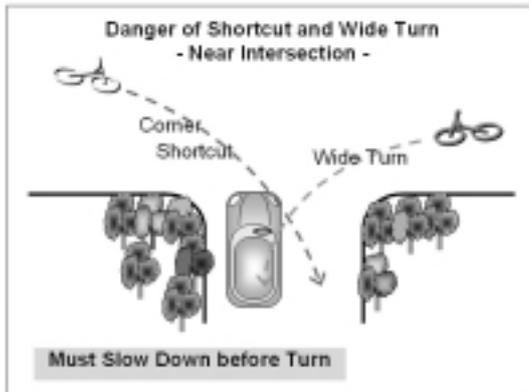Besides neglect of red lights or stop signs, figure8 shows other examples of improper behaviors of cyclist operators.

(1) Turn or path change without signal
------------------- almost 100%

(2) Running without lights in the dark
------------------- around 10%

(3) Running on the right side of the road*² or shortcut/wide turn at the corner (figure9,10,11)----- about 15%

-- Examples of Tracing Wrong Path --

Figure9

Figure10

Poster Presentations

Figure 11

4. Influence of Passenger on Accident Occurrence

The number of casualties is about 2.7million for operators, and 50 thousand for passengers in total through 1990 to 2007.
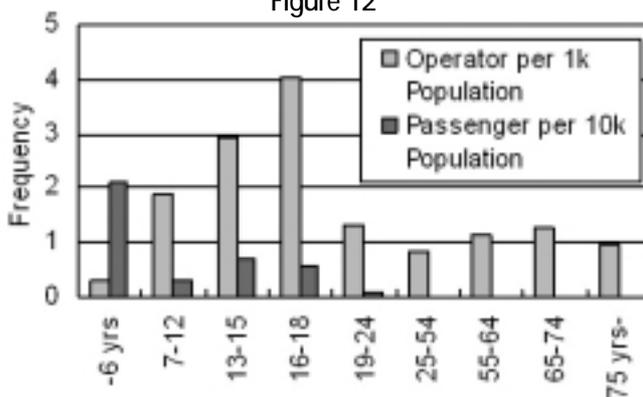
Figure 12

Figure12 shows the number of cyclist casualties per population in thousand for operators, and in ten thousands for passengers (=frequency).
Operators aged between 7 and 18 which correspond to primary, junior high and high school students show highest frequency of accident involvement.
As to passengers, infants of age below 6 show highest frequency, and students show the second highest frequency.
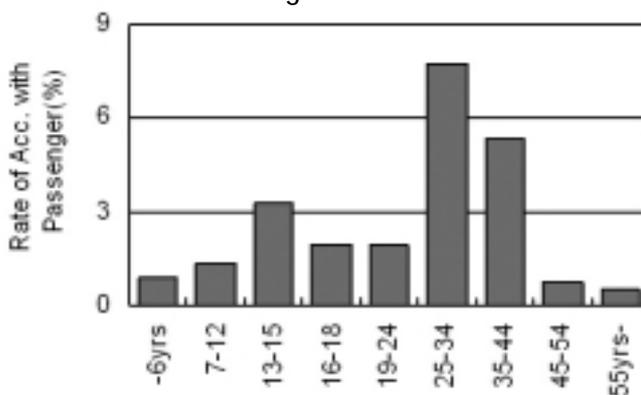There are very few casualties of passengers above 25 years old.

Figure 13

Figure13 shows the Rate of Accidents with Passengers[*3] by each age range of operators. The age range of higher rate is 25 through 44, which corresponds to parents and 13 through 24, which corresponds to junior high school, high school and university students.

*3 Rate of Accidents with Passengers(%) = Number of accidents with passengers on the bicycles/Total number of accidents $\times$ 100
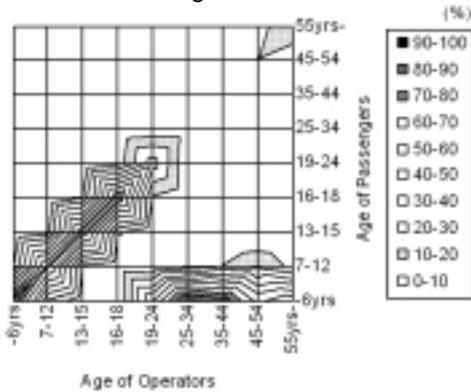
Figure 14

Figure14 shows the distribution of the age of passengers (excludes accidents without passengers).

It tells that when people carry passengers on their bicycles, 90% of parents carry infants, 80% of students carry students and 70% of people above 55 carry infants and sometimes adults.

Figure 15
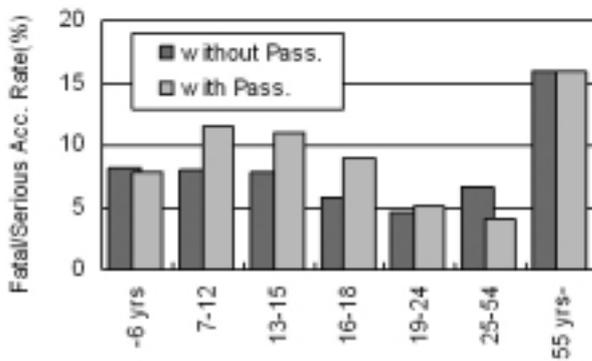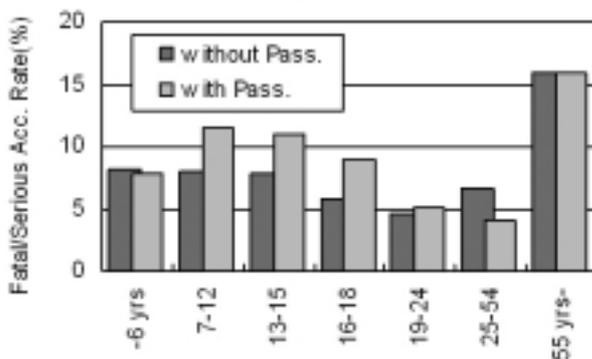

Figure15 shows the Fatal/Serious Accident Rate*4, with or without passenger respectively (excludes accidents with pedestrians).

Student cyclists carrying passengers are more likely to have fatal/serious injury accidents than without. The reason is if students carry passengers on their bicycles, they mainly carry students as heavy as operators are, which results in the loss of stability.

On the other hand, parents with passengers are less likely to have fatal/serious injury accidents than without. Infants, which are the main passengers that parents carry, do not weigh so much as adults do. In this way, even if parents carry infants on their bicycle, the effect given on stability stays low. Moreover, the fact that parents be extra careful when carrying infants, must be another reason for the low Fatal/Serious Accident Rate.

Figure 16

Influence of the number of child passengers on Fatal/Serious Accident Rate (see figure16).
Conditions of analysis:
a) Female bicycle operators of age 25 thorough 44, which supposes mothers.
b) Time accidents occurred is 6:00-10:00 and 13:00-16:00, which supposes sending children to, or picking children up at kindergarten or primary school.
c) Passengers are children aged under 12.

Fatal/Serious Accident Rate with child passengers is lower than without. It proves that even in disadvantageous condition more careful operation could reduce the risk of severer accidents.

*4 Fatal/Serious Accident Rate(%) = Number of fatal and serious accidents/Total number of accidents × 100

5. SUMMARY

a) Number of cyclist casualties is very slow in decrease, compared with other road users.

c) Number of bicycle to pedestrian accidents is in rapid increase.

b) Cyclists have been regarded to be victims in the traffic, because they are more likely to get injured. But in many bicycle accidents, we found that cyclists did cause accidents by their improper manner of riding.

d) More careful cycling could reduce the risk of severer accidents.
The lower Fatal/Serious Accident Rate of mothers with child passengers is the evidence.