Road Traffic Accident Involvement Rate by Accident and Violation Records: New Methodology for Driver Education Based on Integrated Road Traffic Accident Database

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Abstract

A new database system was developed by integrating the license data of all drivers in Japan (80 million drivers) with 11 million road traffic accident data from the year 1995 to 2007 and 130 million road traffic violation data from the year 1993 to 2007 to study the relation between accident/violation experience and accident rates.
The results of data analysis using the database are as follows;

1) There is a relation between the number of accidents/violations in the previous 5 years (from the year 2002 to 2006) and the accident involvement rate in the year 2007.
2) The more accident or violation records is, the higher the accident involvement rate is. This relation is observed in male and female, all age groups and most of prefectures (regions).
3) Analyzing a relation between each violation and the accident involvement rate, there is a strong correlation between the number of disregarding traffic signal and the accident involvement rate.

Though the conditions of road traffic accidents and traffic violations differ in prefectures, driver education can be improved by considering these conditions and the relations between accident or violation experience and accident rates mentioned above.

1. Introduction

1.1 object

 Among three Es of traffic safety, Education and Enforcement are as important as Engineering for discussing road traffic safety measures, but the evaluation of road traffic safety measures from the viewpoint of Education and Enforcement has been insufficient compared to Engineering. It might be one of the reasons that there is no systematic evaluation method for Education or Enforcement.

 The contribution of a random factor to a road traffic accident is not small, and the characteristics of a single road traffic accident does not always reflect of mental and physical driving characteristics of drivers involved in the concerned accident. But the characteristic of road traffic accidents caused by a driver, who has caused the same type of accidents or committed the same type of traffic violations several times, is thought to reflect the driving characteristics of the driver. Moreover a driver with particular driving characteristics may cause a particular type of accident or commit a particular type of violation. It is useful to study the relationship between accident or violation experience and driving characteristics for discussion of human factors of traffic accident.

 A database integrated with road traffic accident and traffic violation was developed and used to study the relationship between accident and violation experience and accident involvement rate.

1.2 Needs and seeds

(1) Needs

Importance of driver education
A lot of road traffic safety measures have been implemented. But the effect of Education and Enforcement, which consist of 3 Es of road traffic safety with Engineering, are thought to be smaller than that of Engineering, such as road and vehicle safety measures. It is necessary to improve safety measures related to Education and Enforcement for further reduction of road traffic accidents and fatalities.

Driving education for the old people
The aging of population is remarkable, and the baby-booms will be 65 years old in several years in Japan. The aging of population is also the aging of drivers, and safety driver education for old people is highly required. The level of driving performance is depending on the individual, but anybody experiences the decline of driving performance with aging even if his performance is higher than the average people. It is one of the risks of old drivers that he is not able to perceive the decline of his driving performance properly. It is necessary to analyze the mechanism of the increase of accident risk with aging to reduce traffic accidents caused by old drivers.

(2) Seeds

Integrated database
ITARDA has been developed an integrated database system since its foundation and made several studies with the database. The latest integrated database has 80 million driver data, 11 million accident data (from the year 1995 to 2007) and 130 million violation data (from the year 1993 to 2007). This database is so large and new that any standard analysis method has not been developed, and most of studies using this database are for statistical reports and trial analyses using sample data (0.1% of total). The amount of this database is larger than that of Population Census of Japan, which is carried out every 5 years, and the efficient utilization of this database is expected to improve road traffic safety.

Improvement of computer
The data processing of such a large-sized database can be done with a small computer system, according to the recent development of computer technology and cost down. And it is possible to process not only samples but also all data for analyzing accident and violation experience and accident rates.

(3) Seeds meet needs

 Considering such needs and seeds, ITARDA (Institute for Traffic Accident Research and Data Analysis) started to study the relations between the experience of traffic accidents or violations and traffic accident involvement rates for improving driver education and traffic enforcement.

1.3 Previous studies

 ITARDA made several studies on the relationship between traffic accident and violation using the integrated database. The following results of previous studies were derived from sampled data, but some of them are consistent with other related studies.

(1) The existence of high-risk drivers ([2])
 The frequencies of drivers with multiple accident experience were more than the expected number based on Poisson's distribution. Therefore there must be high risk drivers, those who cause an accident or commit a violation at higher rate and have more accident and violation records than an ordinary driver.

(2) A repeat violator with a low accident rate ([1])
  According to correlation analysis, there is a correlation between the number of accidents and violations for most of age groups. But the correlation is small for drivers aged around 50 years.

(3) Relation between accident and violation ([2], [3])
  There is a correlation between a collision type and a violation type of drivers with multiple accident and violation records..

(4) Influence of accident experience ([4], [5])
  A driver, who experienced an accident after long absence of accident, tries to drive more safely just after the accident, but loses his concentration year by year. A driver controls his driving manner and driving frequency with aging.

(5) Risk of non-accident driver ([6])

 The decline of driving performance with aging comes to any driver, and some drivers without accident/violation experience for a long time may be involved in a serious traffic accident without perceiving the decline. The accident characteristics of 4 driver groups, by accident and violation experience, were analyzed and the result showed the accident rate of no-accident/no-violation drivers was not the lowest.

(6) Necessity of area-based analysis

 The status of road traffic accident reflects the road traffic conditions, and enforcement of road traffic is carried out considering the status of road traffic accidents and road traffic conditions. Road traffic is closely related to social and economic activities and geography. Therefore it is necessary to consider prefecture where a driver lives and drives for studying road traffic accidents and traffic violations.

2. Integrated road traffic accident database system

2.1 Integrated road traffic accident database

 The integrated road traffic accident database is constructed by using driver license number, which is commonly involved in driver license data, traffic violation data and traffic accident data. And all variables of these three data are available for extraction and analysis conditions; for example, male drivers born in the year 1951, involved in a rear-end collision as the 1st party(*1) while driving a car, and punished for disregarding traffic signal in the year 2006.

 An integrated database is so large that it is constructed temporarily for a study. (Fig.1)

*1: The 1st party is a person who caused the most culpable failure or the least injured among parties concerned the their culpable failure at the same level,

2.2 Analysis method

 Adding to general calculation of cross tabs, two types of calculations were developed.

(1) Two dimensional distribution

 To get distribution of 2 counter variables; for example, the number of drivers, by the number of experienced accidents and the number of punished violations.

(2) Sequence of the yearly numbers

 To trace the yearly numbers of 1 counter variable; for example, the number of drivers, by sequence of the yearly numbers of accident records in 6 straight years. This method is developed for discussing a traffic accident model considering Markov Process.

3. Analysis and results

Several studies were carried out for discussion of driver education program. It is one of the objects to obtain information that makes a high risk driver change his safety consciousness and his driving behavior.

3.1 Evaluation value

Percentage of drivers who were involved in a traffic accident in a year as the 1st party to all drivers is used as evaluation value for discussing the risk of traffic accident (hereafter, the accident involvement rate). The rate is not per exposure to road traffic but per time interval, so that the frequency of driving per time is not considered.

Table 2a (A) shows the distribution of drivers, who were involved in a traffic accident as the 1st party in the year 2007, by accident and violation experience. The experience of accident is explained with the number of accidents involved in a five-year period starting 2002, and the experience of violation is explained with the number of violations punished in the same period. Table 2b (B) shows the distribution of drivers at the end of the year 2006 by accident and violation experience. The accident involvement rates are calculated by A/B (Table 2c) and Fig.2 is drawn with the result of Table 2c.

The accident involvement rates for several groups by driver characteristics, such as prefecture, sex and age, are discussed in this report. The developed system is practical to show cross tabs as shown in Table 2c, but the one dimensional distribution is mainly discussed.

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3.2 Driver characteristic for analysis

The accident involvement rates by accident and violation experience were calculated considering the following driver characteristics.

(1) Prefecture

The status of road traffic accident and traffic violation differs in prefectures where drivers live or drive so that 12 prefectures out of 47 were selected to discuss the influence of each prefecture on the accident involvement rate. They are 11 prefectures which contain the major cities and Okinawa, which has the unique status of road traffic condition and traffic enforcement.

(2) Age and sex

Driving performance, safety consciousness and characteristics of accident or violation differ in sex and age of drivers, so the accident involvement rate was calculated by sex and age.

(3) Type of violation

Four types of traffic violations were selected. Illegal parking and speeding are major traffic violation, and disregarding traffic signal or stop sign are thought to be dangerous driving behavior that may cause a traffic accident. Illegal parking is usually not risky, but thought to be an indicator of legality. Table 1 shows the numbers of drivers in 12 prefectures and numbers of drivers with accident or violation experience in the 5-year period starting 2002.

3.3 Results

(1) Study 1: Male and female drivers in Hokkaido and Tokyo

To discuss the influence of prefecture and sex at the same time, male and female drivers in Hokkaido and Tokyo were analyzed. Hokkaido is the northernmost island of Japan, and the population density is the lowest in Japan. Tokyo is urbanized and the population density is the highest in Japan. Fig.3 to Fig.8 show the accident involvement rates of male and female drivers in Hokkaido and Tokyo by accident and violation experience. The number of female drivers in Hokkaido with 3 accident records and more is small, so that the rate is not shown. The accident involvement rate is probability variable so that the 95% probability ranges are also shown.

Fig.3 shows the accident involvement rates by the number of accident records, Fig.4 shows the rates by the number of violation records, and Fig.5 to 8 shows the rates by illegal parking, speeding, disregarding traffic signal and stop sign respectively. The numbers of female drivers with accident or violation record are not large, so that 95% probability range is large. These figures show interesting results, and the number of disregarding traffic signal is thought to be the most persuasive indicator of accident risk among 4 violations. Because the level of accident involvement rates by the number of disregarding traffic signal is the highest. These 6 figures show that "the more the number of accident records or violation records, the higher the accident involvement rate is (hereafter, the relation A)" as shown in Table 2c. That is, the relation A could be found in drivers in Hokkaido and Tokyo regardless their sex.

Fig.5 and Fig.6 show that the level of influence on the accident involvement rate differs in violation types. The level of accident involvement rates by illegal parking are almost the same in Hokkaido and Tokyo, but those rates by speeding are different between Hokkaido and Tokyo. Drivers punished for illegal parking in Hokkaido are thought to live in urban area, such as Sapporo, and they drive a car in almost the same road traffic condition as Tokyo. So the result shown in Fig.5 is reasonable. The percentage of drivers with speeding records in Tokyo is lower than that in Hokkaido. But the accident involvement rate by speeding in Tokyo is higher than that in Hokkaido (Fig.6). The meaning of speeding in Tokyo is not the same to that in Hokkaido, where a driver commits speeding more easily. Therefore it is necessary to consider the prefectural difference of road traffic condition for discussing driver education and traffic enforcement.

(2) Study 2: 12 prefectures

To confirm whether the relation A is found in drivers of other prefectures, male drivers of 12 prefectures were analyzed. Fig.9 shows the accident involvement rates by the number of accident records, Fig.10 shows the rates by the number of violation records, Fig.11 is by illegal parking and Fig.12 is by speeding. There is some exception in Fig.11 and 12, that an accident involvement rate declines while the number of records increases, but the decline is statistically not significant and the relation A could be applied to 12 prefectures. The relation A is also found in cases of disregarding traffic signal and stop sign.

(3) Study 3: Age groups

To confirm whether the relation A is found in drivers regardless of age, male drivers of Tokyo were categorized into 6 groups (25-34, 35-44, 45-54, 55-65, 65-74 and 75-84 years old) and analyzed. Fig.13 shows the accident involvement rates by the number of accident records, Fig.14 shows the rates by the number of violation records, Fig.15 is by illegal parking and Fig.16 is by speeding. The left side graph of each figure shows the effect of age by the number of records, and the relation A is found in all left side graphs. The right side graph shows the effect of experience by age group using the same data.

Right side figure of Fig.13 and Fig.14 shows that the influence of accident experience is almost the same as that of violation for male drivers aged 54 years or younger. But the influence of accident experience is different from that of violation experience for male drivers aged 55 years or older. The accident involvement rate of male drivers with multiple violation records is the highest at the age 65-74 years, and the rate of male driver with accident experience is the highest at the age 55-64 years. The influence of experience on the accident involvement rate is found in only old drivers with accident records, and not found in old drivers with violation records, while no influence is found in younger drivers as far as 5-year experience is concerned.

(4) Study 4: Accident and violation

Table 3 shows the accident involvement rate by accident experience and violation experience of 55-94 years old male drivers in Tokyo. The feature shown in Table 3 is as same as that shown in Table 2c. But the level of the influence shown in Table 3 is higher than that shown in Table 2c.

It is very important that a traffic violator without accident experience sometime has the same or higher accident involvement rate than an accident driver. For example, the accident involvement rate of drivers with 5 violation records and more and no accident record is almost the same as that of drivers with 2 accident records and no violation record.

3.4 Drivers with less than five-year experience

In Japan most of people get driver license at their twenties, so drivers aged 35 and younger might have less than 5-year driver license experience. A novice driver without enough experience is involved in a traffic accident more frequently. Calculations for drivers excluding novice drivers with less than 5-year experience were carried out, and the result is almost the same.

4. Discussion

4.1 The meaning of the relation A

The relation A, "the more the number of accident records or violation records is, the higher the accident involvement rate is", is found in any driver group, regardless of prefecture, sex and age, and the relation A might be a general relation. Particularly it is meaningful for driver education that the relation A is found in not only the number of accident records but also the number of violation records. That is, the number of violation record could be the indicator of accident risk.

4.2 The reason of the relation A

There are two factors contributing the increase of the accident involvement rate per driver and time. One is the manner of driving; such as speeding, disregarding traffic signal or stop sign, short headway, using short gap, which is related to an accident rate per exposure. And the other is the frequency of driving per time; how many times you drive a year, or how long you drive a year.

According to Table 2c or Fig.2 the relation A is found in both accident experience and violation experience, and there might be a common factor related to driving characteristics that increase the number of accident records and violation records. And the two factors introduced above may have some relation. The author thinks that the influence of the driving frequency is greater than that of driving manner because there are some driving manners related to violation but not to accident.

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4.3 The influence of accident and violation experience

The experience of accident or violation is expected to change a driving characteristics (driving manner and driving frequency) and reduce the accident involvement rate. However the relation A shows that there is not such influence of experience to reduce the accident involvement rate. Reference 4 shows that the experience of accident reduced an accident rate per exposure and the effect did not last for a long time. But the result above is derived from 5-year experience, and it is not unreasonable.

Concerning to drivers with accident experience, the accident involvement rate increases with aging up to 60s, and the same feature is found for drivers with violation experience. A driver with more accident or violation records may drive more than a driver without record. A driver, who usually drives for business purpose, can change his driving manner but not driving frequency. Therefore the accident involvement rate of such driver is thought to be increased gradually with his decline of driving performance (the increase of the accident rate per exposure). On the other hand an old driver, who usually drives for private purpose, can change not only his driving manner but also driving frequency. If an old driver involved in a traffic accident controls both his driving manner and driving frequency, he succeeds to reduce his accident involvement rate. The results of Fig.13r show that accident experience has an effect on old drivers but the result of Fig.14r shows that violation experience has no effect on old drivers.

The result, that accident or violation experience has no influence to decline the accident involvement rate except for old drivers with accident experience, may require a new concept for driver education and traffic enforcement.

4.4 Violation records as indicator of exposure

The number of violation records has two meaning, one is a matter of driving behavior and the other is a matter of driving frequency. The former has been emphasized more than the latter while discussing driver education. But the latter is also important and effective factor for driver education and accident reduction as the former. A driver with several violation records may be exposure to road traffic at the high frequency, whether his violations are related to dangerous behavior or not. Even if the accident rate per exposure is a half of the average driver, a driver with 3 times frequency of the average driver has a higher accident involvement rate than the average driver.

It is necessary to teach and explain that there is a correlation between the accident involvement rate and the number of violations, and a driver with a high frequency of driving must drive safer (at lower accident rate per exposure) than a driver with a low frequency.

4.5 Driver education based on traffic violation experience

A driver education based on traffic violation experience is proposed by the author. The proposed education is carried out depending on the accident involvement rate estimated by violation experience of trainees. The proposed education has following advantages.

(1) As preventive safety measures

About 0.83 million injury traffic accidents occurred and 8.5 million traffic violations were enforced in Japan in the year 2007. Violation frequency was ten times as many as accident. It means that most of drivers may experience a violation earlier than an accident. And a safety education for traffic violators can be carried out earlier than that for accident drivers. If such a safety education is properly carried out in advance, the effect may be realized earlier than that for accident drivers.

The high frequency makes it possible to analyze related data precisely and comprehensively according to driver characteristics. For example, concerning to male drivers aged 55-64 years in Tokyo; the accident involvement rate of drivers with 5 violation records and more and no accident record in the previous 5 years is almost the same as that of drivers with 2 accident records and more and no violation record (3.3%, 3.2% refer to Table 3). This shows that the accident involvement rate of drivers without accident records is not always low. A driver education considering the difference of driver's characteristics is more acceptable.

(2) More related to driver's consciousness and behavior

Most of traffic accidents are not caused by driver's intentional behavior or consciousness, but most of traffic violations are committed by driver's consciousness. It might be required to continue one's attention to prevent an event, which is not related to driver's consciousness and hard to foresee to occur. Such action is easy for a machine but hard for a man.

There is a common factor that is related to both accident and violation, so it might be possible to reduce the accident risk by reducing violation. Therefore it may be possible to improve driver's skill or change driver's safety consciousness for reduction of violation and accident.

5. Conclusion

5.1 Results of the studies

(1) The more the number of experienced accidents or punished violations is, the higher the accident involvement rate is.
   There is a strong correlation between the number of accident or violation records in 5-year period starting 2002 and the accident involvement rate in the year 2007. This relation is found in any driver group regardless of prefecture, sex and age.
(2) The number of violation records is a useful indicator of the risk of accident same as the number of accident records.
   Disregarding traffic signal is the most persuasive indicator among 4 violations, illegal parking, speeding, disregarding traffic signal and stop sign. The accident involvement rate of a driver with several traffic violation records and no accident record is almost the same as that of a driver with accident records and no violation record. The driver education based on traffic violation experience is useful and preventive measure.
(3) The degree of influence differs in prefectures.
   The degree of influence, which is a ratio of the number of records to the accident involvement rate, differs in prefecture, sex and age of drivers. Road traffic regulation in each prefecture is carried out according to the status of road traffic and road traffic accident so that driver education based on violation experience should be carried out considering the difference of conditions.
(4) The influence of accident experience to reduce the accident involvement rate is found in only old drivers.
   It is found in male drivers with accident experience aged 55-64 years in Tokyo. But the influence of violation experience to reduce the accident involvement rate is not found in drivers with multiple violation records. And there is neither influence of accident nor violation experience in younger drivers.

5.2 Usefulness of the new analysis

The newly developed analysis system makes it possible to analyze the integrated road traffic database precisely and comprehensively. The result of studies using the system shows; "The more the number of accident records or violation records is, the higher the accident involvement rate is." This result is important and useful for discussing driver education, but it is only the start.
The new analysis system is useful for analyzing a relationship between accident and violation to discuss driver education and traffic enforcement.

5.3 Future studies

(1) Developing an evaluation method to identify a high risk driver
   The relation A, the more the number of violation records is the higher the accident involvement rate is, is found in any driver group, but the ratio of the number of records to the accident involvement rate differs in prefecture(county), sex and age of driver. The number of violation records or type of violation, which is a guideline to identify a high risk driver, should be discussed for each driver group.
(2) Developing a driver education program for a high risk driver
   It is possible to identify a high risk driver, but it is not acceptable in a motorized society, such as Japan or other developed countries where a car is not dispensable, to ban all high risk drivers from the society. It is also required to develop an education program for a high risk driver.

Acknowledgement

References

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[5] The Japan Research Center for Transport Policy, Physical and Mental Characteristics of the Elderly People and Road Traffic Accident Report A-484, 2009 (in Japanese)

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Fig 1 : The Integrated Road Traffic Accident Database and the New Analysis System
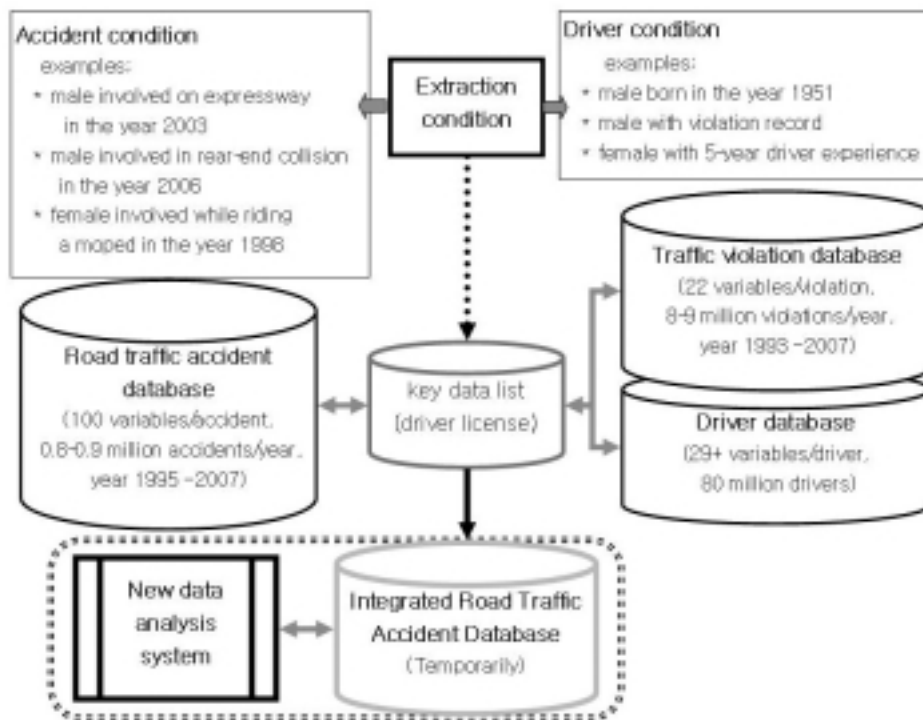
Table 1 : Numbers of Drivers with Accident/Violation Record in the previous 5 years (2002 - 2006)

Prefecture/ sex		Number of drivers	Drivers with accident record	%	Drivers with violation record											
					any type	%	illegal parking	%	speeding	%	disregarding traffic signal	%	disregarding stop sign	%		
Hokkaido	male	1,932,276	84,845	4.4	974,794	50.4	107,605	5.6	595,680	30.8	137,624	7.1	79,078	4.1		
	female	1,428,797	33,068	2.3	425,635	29.8	50,878	3.6	224,965	15.7	52,298	3.7	43,228	3.0		
Miyagi	male	844,081	40,839	4.8	338,118	40.1	31,787	3.8	144,015	17.1	28,661	3.4	36,481	4.3		
Tokyo	male	4,352,228	229,528	5.3	1,910,047	43.9	770,213	17.7	616,370	14.2	158,267	3.6	277,358	6.4		
	female	2,878,173	52,621	1.8	519,354	18.0	243,113	8.4	89,858	3.1	27,728	1.0	89,164	3.1		
Saitama	male	2,590,781	155,513	6.0	1,050,556	40.5	247,985	9.6	345,294	13.3	82,541	3.2	161,378	6.2		
Chiba	male	2,224,900	114,789	5.2	976,506	43.9	228,068	10.3	310,396	14.0	64,948	2.9	136,009	6.1		
Kanagawa	male	3,181,388	189,271	5.9	1,471,592	46.3	488,720	15.4	509,784	16.0	98,151	3.1	135,432	4.3		
Aichi	male	2,718,921	157,507	5.8	1,144,033	42.1	261,880	9.6	462,089	17.0	128,501	4.7	215,334	7.9		
Osaka	male	2,960,636	198,318	6.7	1,459,758	49.3	517,404	17.5	680,516	23.0	326,023	11.0	90,090	3.0		
Hiroshima	male	1,023,416	60,394	5.9	406,428	39.9	56,510	5.5	111,337	10.9	53,456	5.2	47,765	4.7		
Kochi	male	273,805	12,582	4.6	130,083	47.5	11,935	4.4	58,585	21.4	12,083	4.4	24,647	9.0		
Fukuoka	male	1,739,191	135,329	7.8	866,582	49.8	134,587	7.7	420,826	24.2	103,270	5.9	113,433	6.5		
Okinawa	male	462,358	15,870	3.4	199,634	43.2	45,500	9.8	25,430	5.5	19,851	4.3	4,161	0.9		
All Japan	male	45,412,614	2,559,639	5.6	20,121,338	44.3	3,844,034	8.5	7,972,374	17.6	2,239,700	4.9	2,722,713	6.0		
	female	34,494,598	1,129,535	3.3	8,678,614	25.2	1,616,173	4.7	2,674,249	7.8	776,785	2.3	1,530,105	4.4		

Note) Japan consists of 47 prefectures.

Table 2 Accident Involvement Rate as 1st party in the year 2007 by Experience of Accident and Violation in the previous 5 years (2002 - 2006)   < Male drivers in all Japan >

Table 2a A : Number of drivers involved in traffic accidents in the year 2007

		violation records in the previous 5 years (2002 - 2006)						
		0	1	2	3	4	5 & more	total
accident records in the previous 5 years (2002 - 2006)	0	156,191	106,866	63,084	38,440	23,377	34,544	422,502
	1	11,350	12,580	9,995	7,042	4,882	7,937	53,786
	2	969	1,405	1,348	1,071	744	1,231	6,768
	3 & more	138	207	225	193	131	222	1,116
	total	168,648	121,058	74,652	46,746	29,134	43,934	484,172

Table 2b B : Number of drivers at the end of the year 2006

		violation records in the previous 5 years (2002 - 2006)						
		0	1	2	3	4	5 & more	total
accident records in the previous 5 years (2002 - 2006)	0	24,461,647	9,645,651	4,256,607	2,087,006	1,097,092	1,304,972	42,852,975
	1	795,194	624,359	383,885	235,565	144,421	204,498	2,387,922
	2	32,293	36,895	29,553	21,324	14,358	22,763	157,186
	3 & more	2,142	3,140	2,779	2,312	1,559	2,599	14,531
	total	25,291,276	10,310,045	4,672,824	2,346,207	1,257,430	1,534,832	45,412,614

Table 2c   C : Accident involvement rate (A/B)

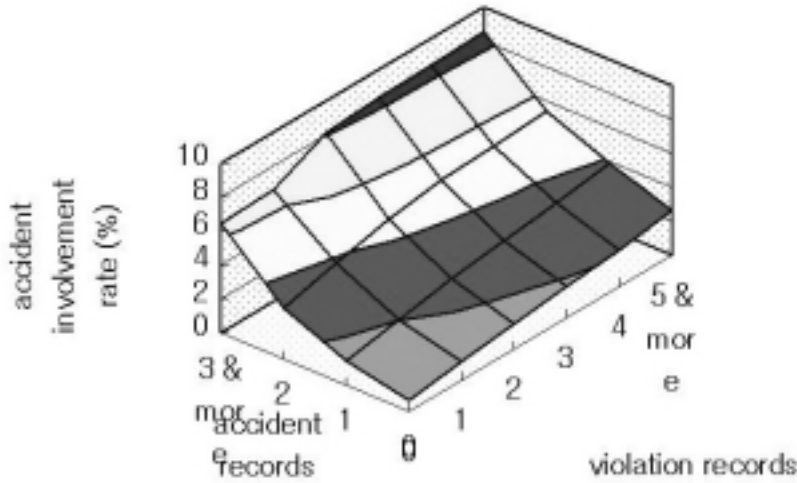|		violation records in the previous 5 years (2002 - 2006)						
		0	1	2	3	4	5 & more	total
accident records in the previous 5 years (2002 - 2006)	0	0.64	1.11	1.48	1.84	2.13	2.65	0.99
	1	1.43	2.01	2.60	2.99	3.38	3.88	2.25
	2	3.00	3.81	4.56	5.02	5.18	5.41	4.31
	3 & more	6.44	6.59	8.10	8.35	8.40	8.54	7.68
	total	0.67	1.17	1.60	1.99	2.32	2.86	1.07

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Fig 2 : Accident Involvement Rate as 1st party in the year 2007
by accident and violation records in the previous 5 years (2002 - 2006)
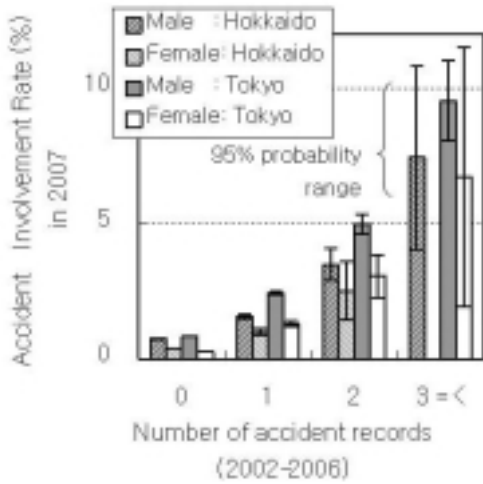

Fig 3 : Accident involvement rate by the
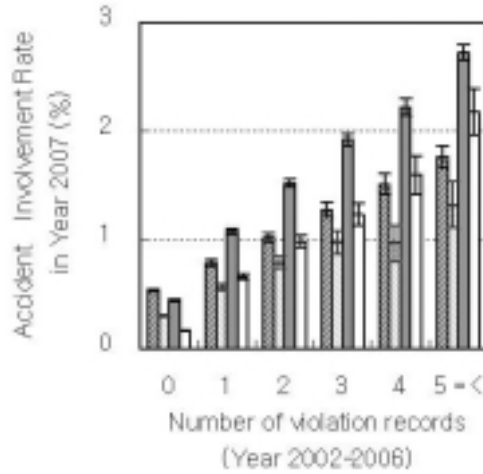experience of accident records

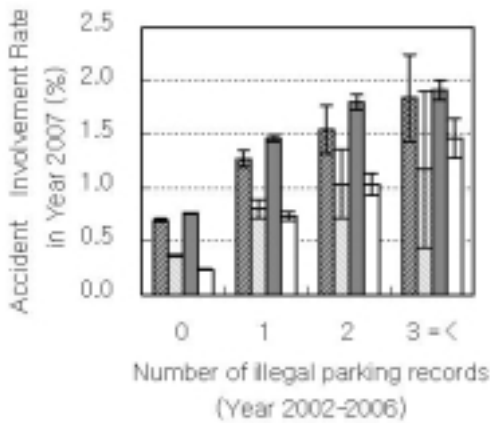Fig 4 : Accident involvement rate by the
experience of violation

Fig 5 : Accident involvement rate by the
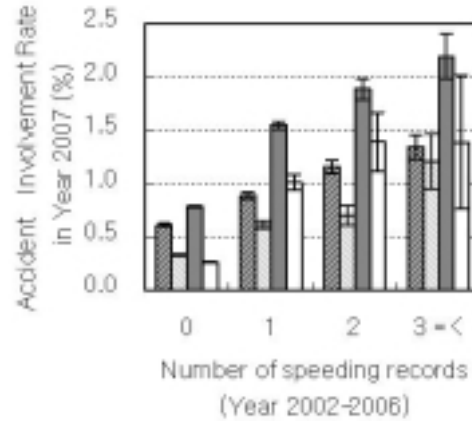experience of illegal parking

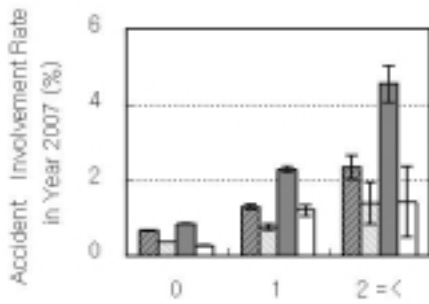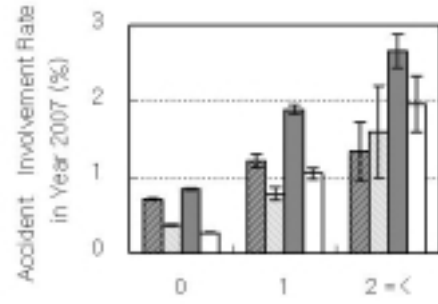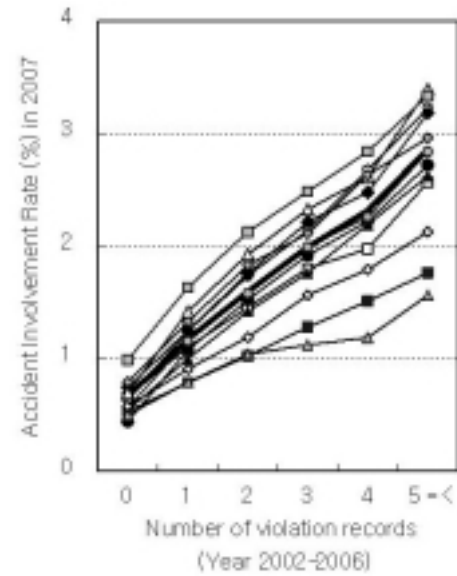Fig 6 : Accident involvement rate by the
experience of speeding

Fig 7 : Accident involvement rate by the experience of disregarding traffic signal

Fig 8 : Accident involvement rate by the experience of disregarding stop sign
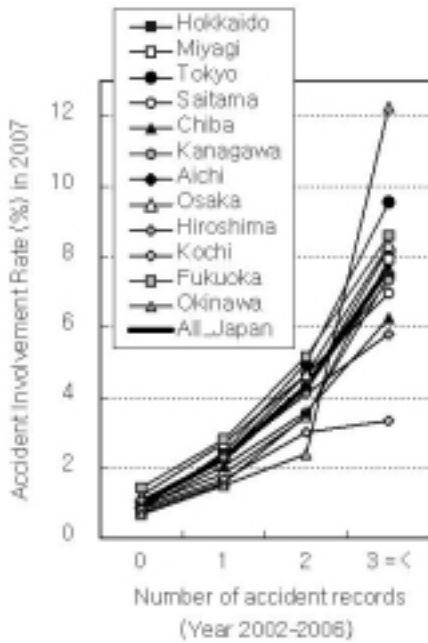
Fig 9 : Accident Involvement Rate by Prefecture and the Experience of Accident as 1st party

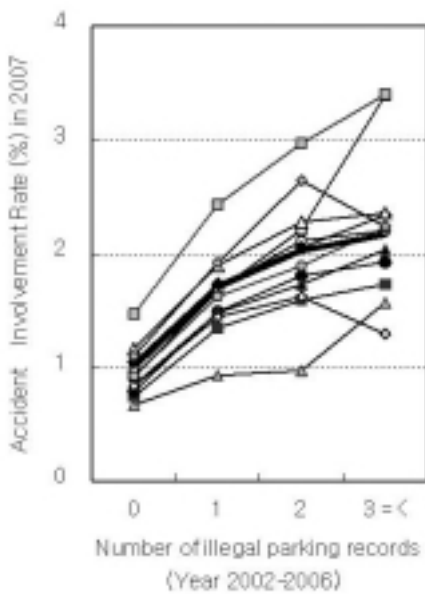Fig 10 : Accident Involvement Rate by Prefecture and the Experience of Violation

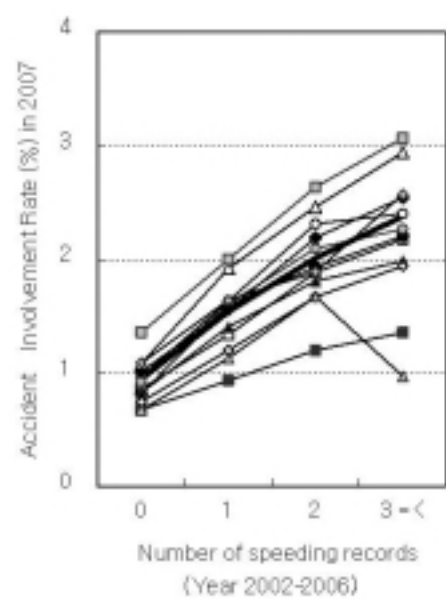Fig 11 : Accident Involvement Rate by Prefecture and the Experience of illegal parking

Fig 12 : Accident Involvement Rate by Prefecture and the Experience of speeding

Oral Presentations
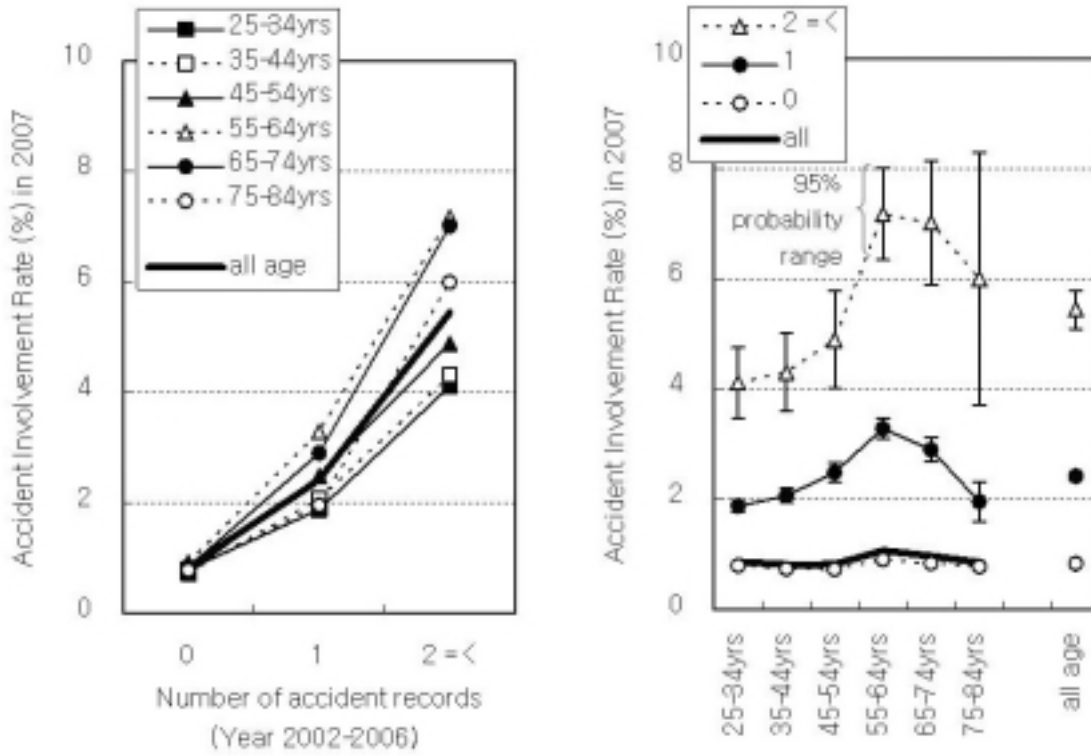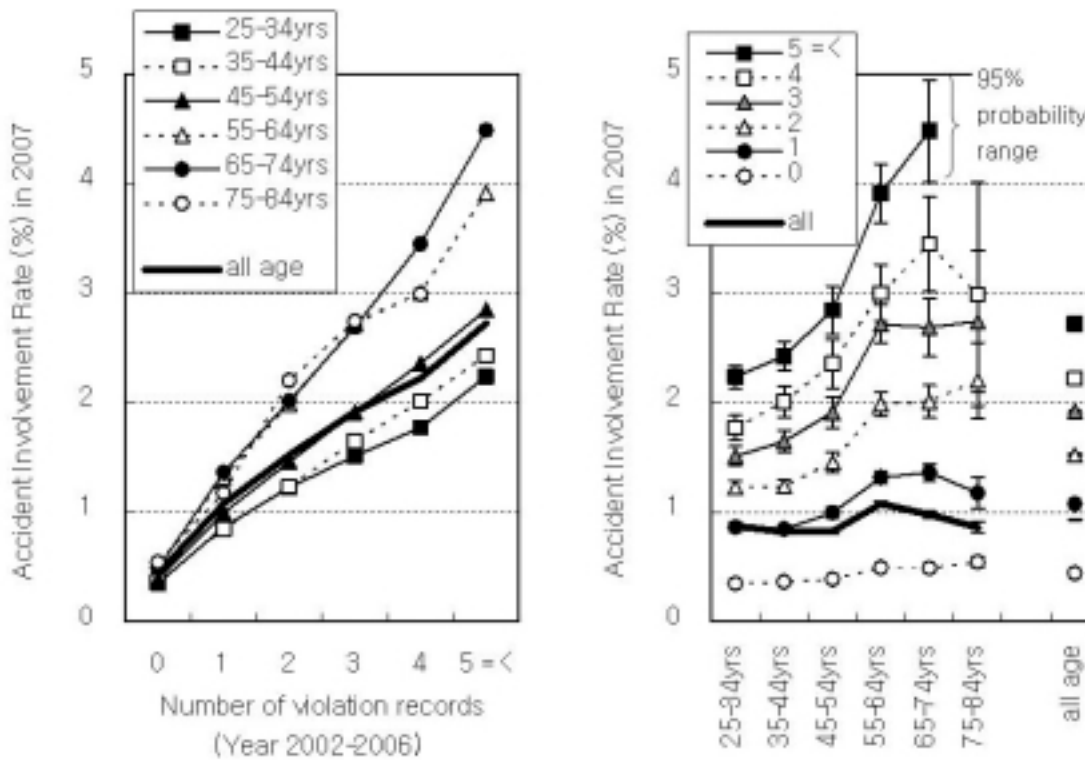

Fig13 : Accident Involvement Rate by Age Group and the Experience of Accident as 1st party
     < Male drivers in Tokyo >

Fig 14 : Accident Involvement Rate by Age Group and the Experience of Violation
      < Male driver in Tokyo >
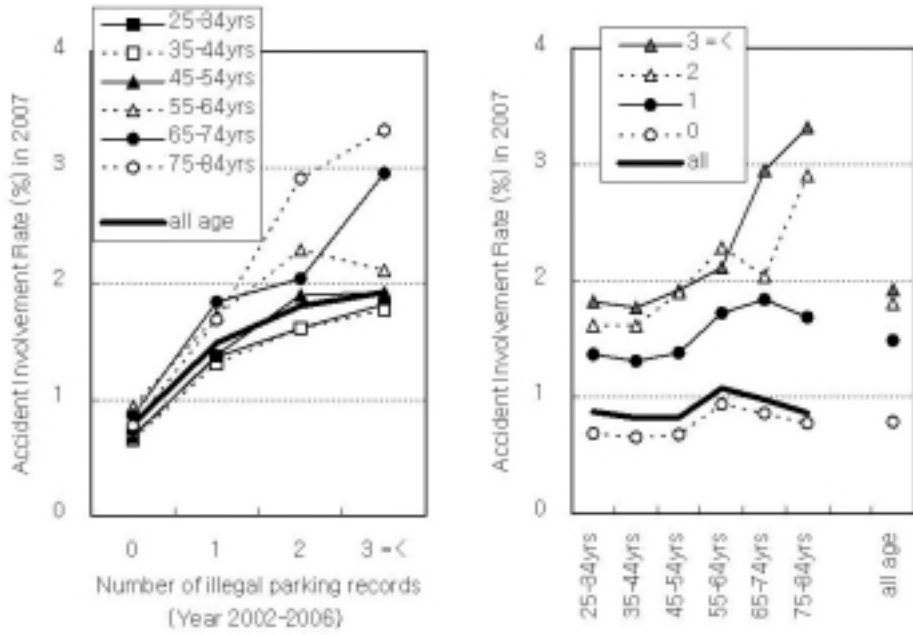
Oral Presentations

Fig 15 : Accident Involvement Rate by Age Group and the Experience of illegal parking
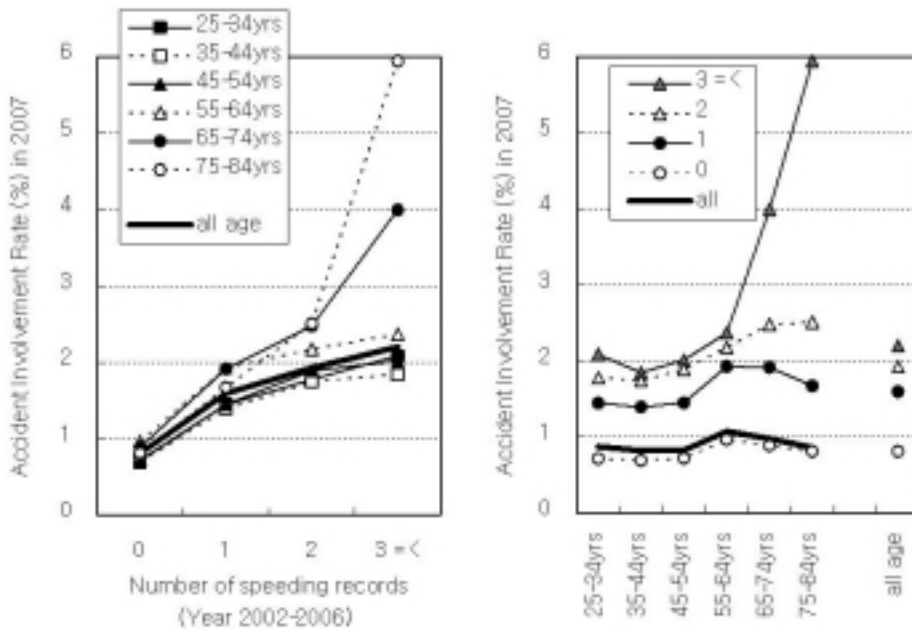   < Male drivers in Tokyo >

Fig 16 : Accident Involvement Rate by Age Group and Experience of speeding
    < Male drivers in Tokyo >

		Number of violation records in the previous 5 years (2002 −2006)						
Number of accident records in the previous 5 years (2002 −2006)		0	1	2	3	4	5 & more	total
	0	0.5	1.2	1.7	2.3	2.5	3.3	0.92
	1	1.8	2.7	3.8	4.9	5.1	6.1	3.29
	2	3.2	6.3	8.1	7.1	6.7	7.5	6.53
	3 & more	8.8	12.1	10.3	9.3	15.2	12.2	11.30
	total	0.49	1.32	1.99	2.72	3.00	3.91	1.08

Table 3   Accident Involvement Rate by the Experience of Accident and Violation
    (male drivers 55-64 years of age in Tokyo)