

ITARDA INFORMATION

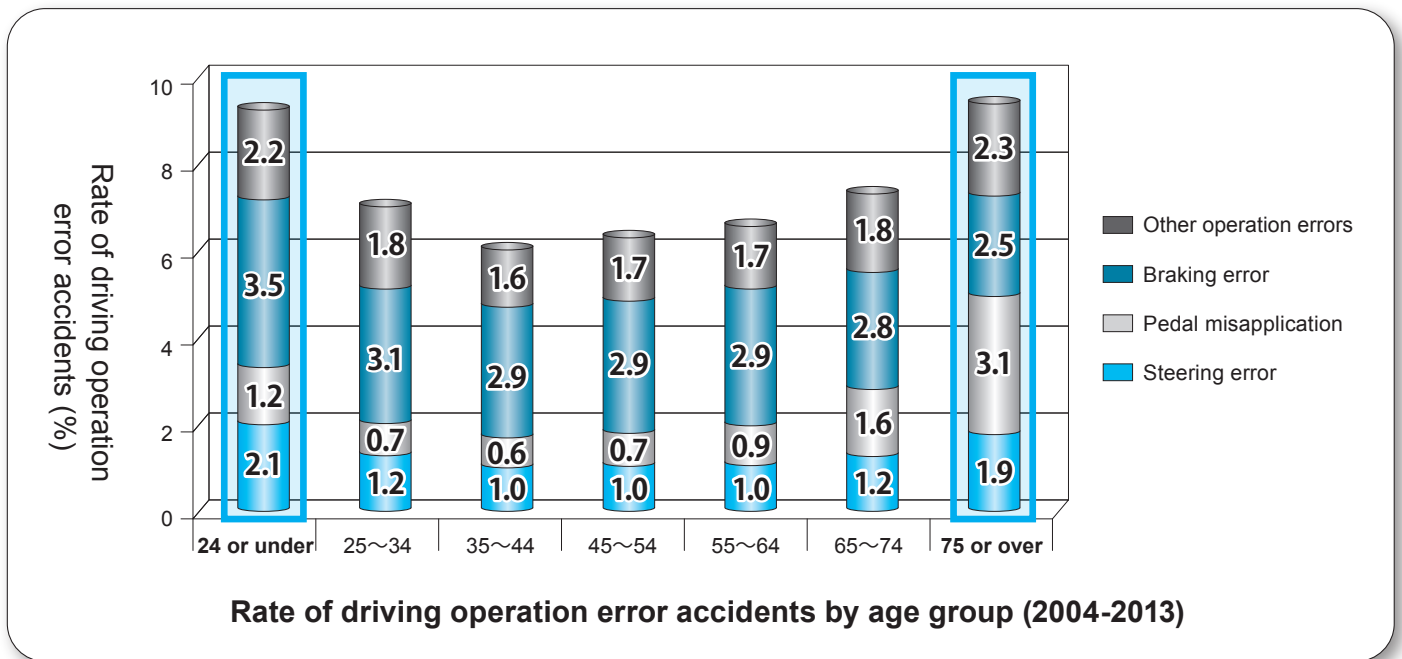
交通事故分析レポート

No.107

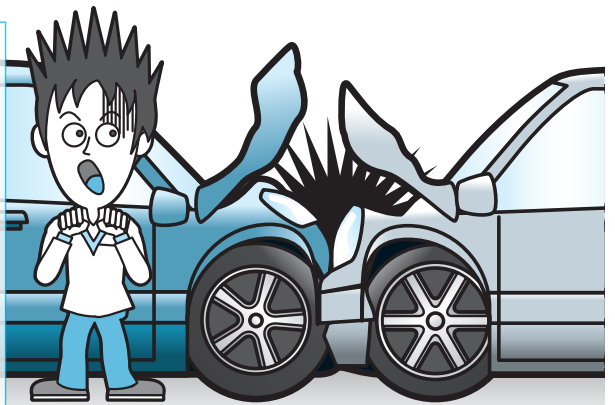
Special feature

Preventing driving operation errors

~Driving operation error accidents are common in young and elderly drivers~



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This issue is a revision of our previous edition of ITARDA Information No.86 "Preventing driving operation errors," with a few data corrections and update of statistical information on accidents. The error in the previous issue and its correction is shown on the table on the right. We apologize for the same.

Percentage of driver fatalities in driving operation error accidents (Front page graph)

	(Error)	(Correct)
Pedal misapplication	3.44%	0.17%
Steering error	0.05%	3.44%
Braking error	0.17%	0.05%

1 Introduction

Let us analyze the occurrence condition of accidents involving drivers of vehicles with four or more wheels (excluding other type of motor vehicle and mini cars¹) categorized as primary parties² due to their higher level of culpability, by the four types of driving operation errors, namely “steering error,” “pedal misapplication,” “braking error” and “other operation errors³” based on the Road Traffic Accident data for a 10-year period from 2004 to 2013.

*1: Mini cars are motored vehicles with an engine displacement (rated output) of more than 20cc (0.25kW) and 50cc (0.6kW) or below. Vehicles with three or more wheels with a wheel tread of over 500mm, vehicles with four or more wheels with wheel tread of 500mm or less possessing a cabin and vehicles with three wheels with wheel tread of 500mm or less with a cabin, fall under this segment.
*2: Primary party refers to the one bearing maximum culpability among the parties directly involved in a traffic accident. In case the culpability lies equally with the concerned parties, it refers to the party that has sustained lesser bodily injuries.
*3: Other operation errors include gear misapplication, error in operating the automatic speed control device etc.

Changes in driving operation error accidents

Table 1 and Fig.1 show the changes in the number of driving operation error accidents for a period of ten years, indicating the following trend:

- (1) The number of driving operation error accidents is showing a declining trend with 41,805 cases in 2013, a reduction of 16,046 cases from the year 2004.
- (2) By type of driving operation error accidents, while “steering error” and “other operation errors” have come down, the growth of “pedal misapplication” in recent years is flat; whereas “braking error” is showing an upward trend.
- (3) “Braking error” is consistently seen in all age groups accounting for about half of the driving operation error accidents in 2013.

Table 1 Number of accidents by type of driving operation errors

Type of driving operation error accidents	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
All types	57,851	60,552	56,613	48,983	47,185	43,977	44,250	44,335	43,292	41,805
Steering error	12,260	11,654	10,619	9,087	8,208	7,711	7,423	6,757	6,434	5,940
Pedal misapplication	7,660	7,471	7,367	7,040	6,548	6,583	6,324	6,432	6,175	6,402
Braking error	22,902	25,022	23,905	19,994	19,709	18,204	18,922	19,848	20,299	20,117
Other operation errors	15,029	16,405	14,722	12,862	12,720	11,479	11,581	11,298	10,384	9,346
All accidents causing bodily injuries	839,343	824,002	784,086	734,394	676,138	654,207	647,510	618,693	597,045	566,357

Note: Table 1 shows the total number of accidents involving the primary party of vehicles with four or more wheels (excluding other type of motor vehicle and mini cars).

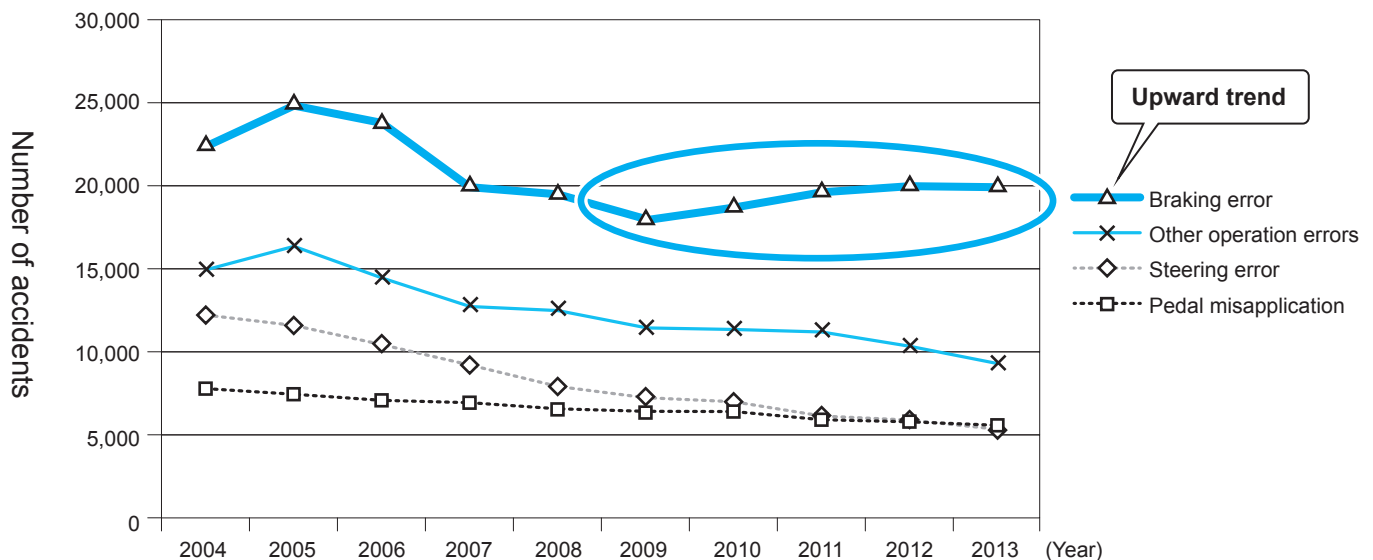


Fig.1 Changes in the number of driving operation error accidents

Changes in the rate of driving operation error accidents in all casualty accidents

Fig.2 shows the change of casualty accidents by type of driving operation error. Steering error shows a slightly downward trend, whereas all other types of driving operation errors show a flat trend initially and an upward shift later. Although not shown in this figure, the rate of driving operation error accidents in all casualty accidents has increased by 0.5 points from the year 2004 to 7.4% in 2013.

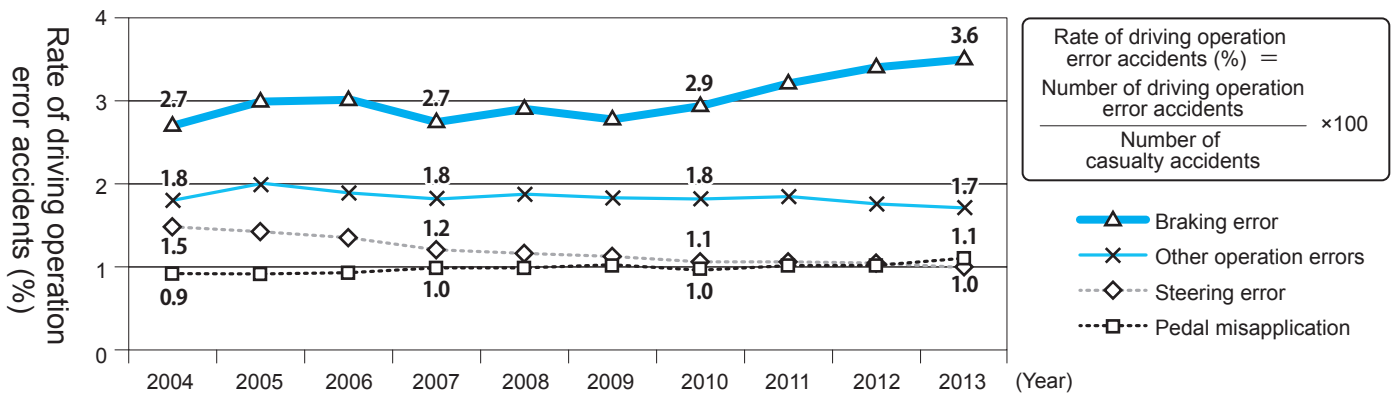


Fig.2 Changes in the rate of driving operation error accidents (Year 2004-2013)

2 The age groups that are likely to cause driving operation error accidents

Fig.3 shows the trend in the rate of driving operation error accidents by age group. Apparently, the rate has crossed 9% in the young drivers of 24 years or under and elderly drivers of 75 years or older, indicating that they are more likely to cause driving operation error accidents as compared to the other age groups. By the type of driving operation error accidents, the following trend is visible.

- (1) Steering error is more common in young drivers of 24 years or under and elderly drivers of 75 years or older.
- (2) Elderly drivers of 75 years or older cause more accidents by pedal misapplication with 2-5 times the rate of other age groups.
- (3) Braking error is more persistent in the age group of 24 years or under and decline with the increase in age.

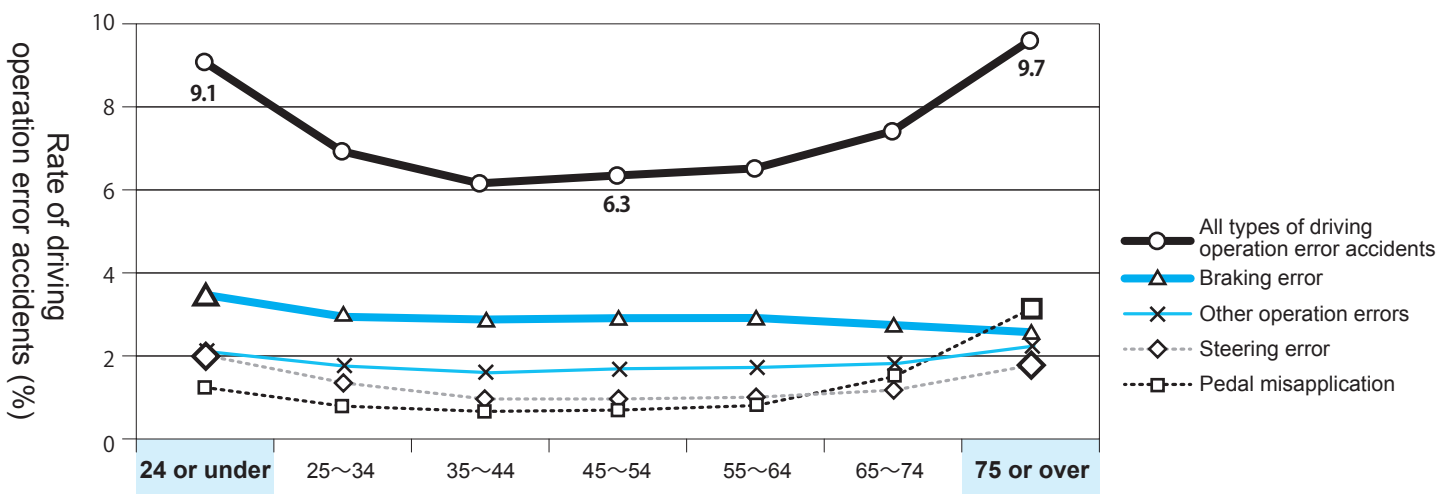


Fig.3 Rate of driving operation error accidents by age group (Year 2004-2013)

3 Driving operation errors can lead to serious accidents

Fig.4 shows the fatal accident rate by type of driving operation error accidents.

Steering error occupies relatively higher fatal accident rate of 4.3% as compared to the other types and is 7 times the rate for all casualty accidents which is at 0.6%, indicating that steering error can lead to serious accidents.

Also as evident from Fig.5, as opposed to the Danger Perception Speed of 40km/h or less in more than 80% of other driving operation error accidents and all casualty accidents, nearly 50% of the steering error accidents occurred at a speed higher than 40km/h.

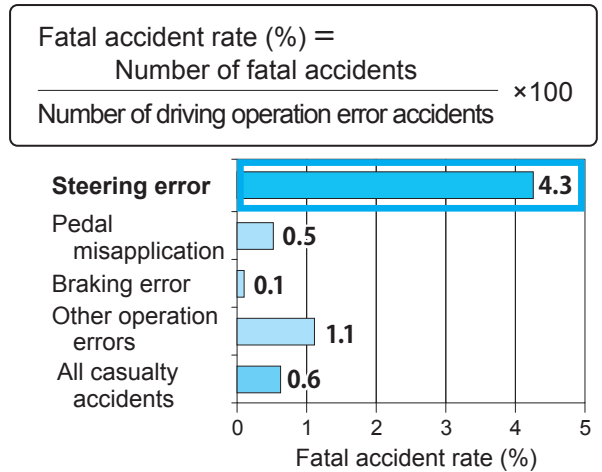


Fig.4 Fatal accident rate of driving operation error accidents (Year 2004-2013)

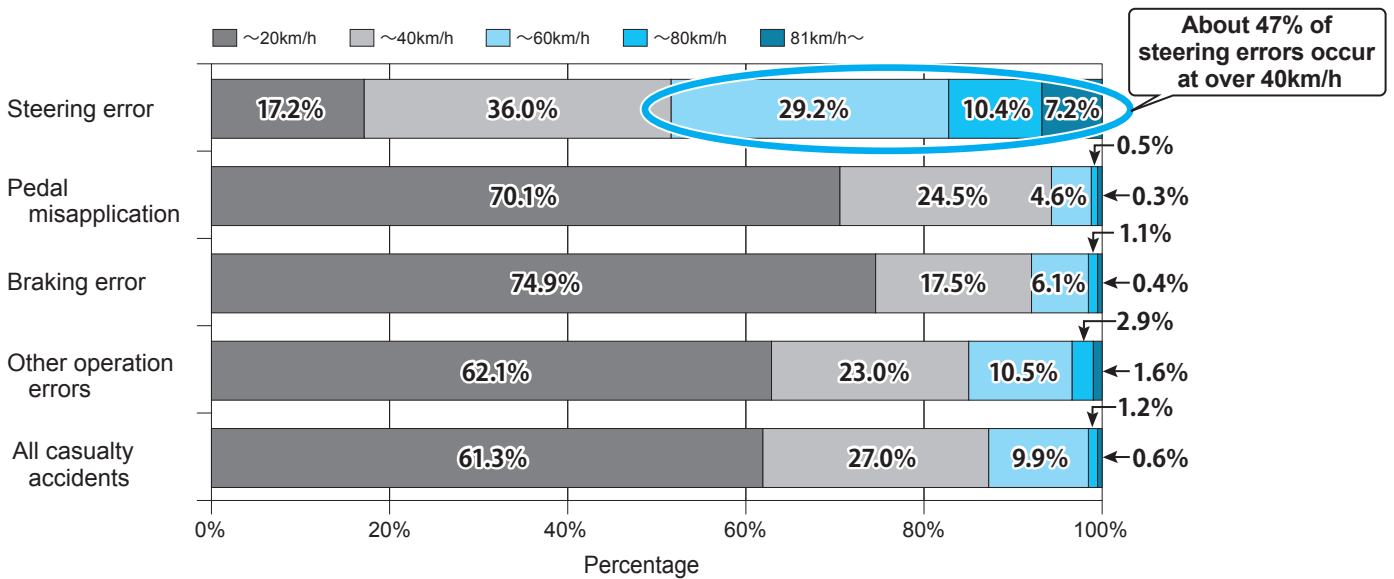


Fig.5 Danger Perception Speed by type of driving operation error accidents (Year 2004-2013)

4 Conditions that are likely to cause driving operation error accidents

In what conditions are the driving operation error accidents likely to occur, let us find out. Figures 6 to 9 indicate the rates of driving operation error accidents in the number of accidents by survey items such as type of accident, road type, road condition etc. for each of the three age groups namely, young group of 24 years or under, middle-age group of 45 to 55 years and elderly group of 75 years or over.

Steering error accidents

Fig. 6 shows the rate of steering error accidents by type of accidents, Danger Perception Speed and road type. Similar trends are visible in all three age groups, with "single vehicle accidents" and "head-on collisions" being high for type of accidents. While the rate increases with the increase in the Danger Perception Speed, when seen by road type, the rate is high for "non-intersection (curves)."

By age groups, the rate is high for young drivers of 24 years or under with 27.3% of single vehicle accidents and 13.8% of accidents occurring on curves are due to steering error. By Danger Perception Speed, the rate is high for young drivers of 24 years or under at speeds higher than 50km/h, whereas the rate is high for elderly drivers of 75 years or over at speeds lower than 50km/h.

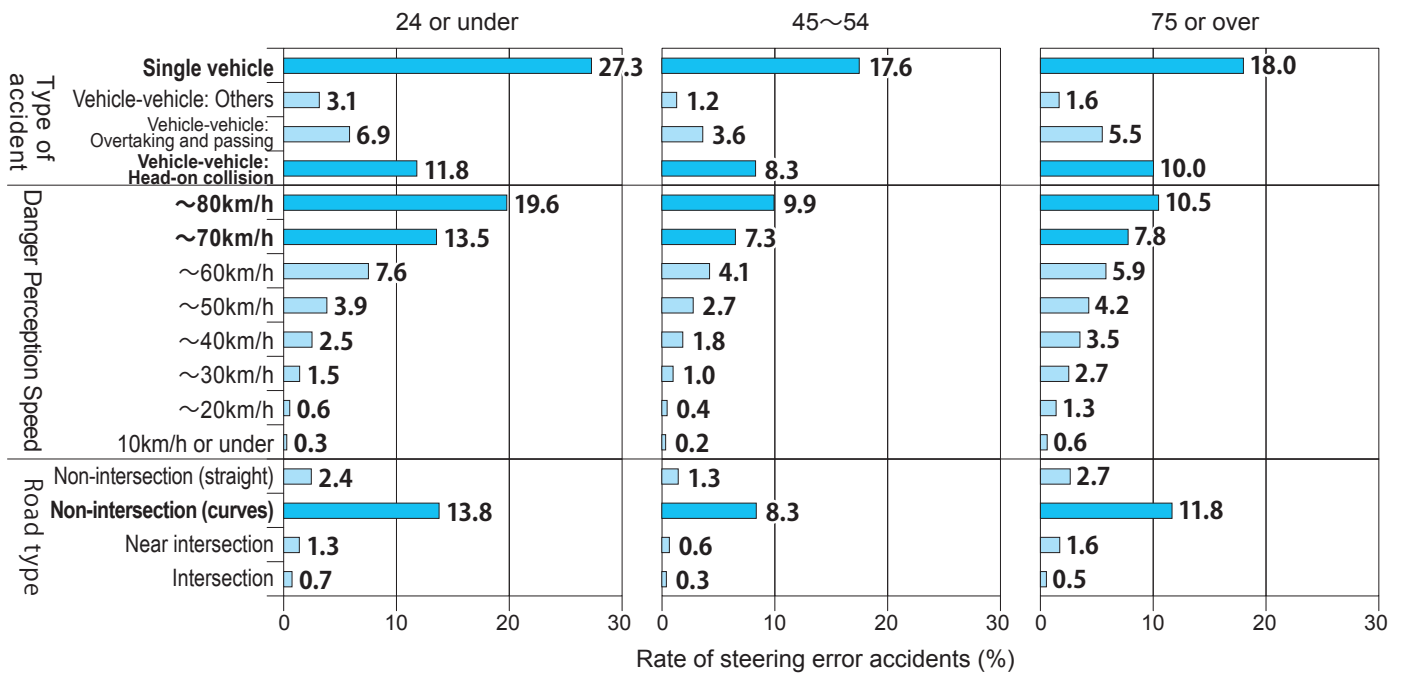


Fig.6 Rate of steering error accidents by type of accidents, Danger Perception Speed and road type (Year 2004-2013)

Let us now study in what situations do the steering error accidents occur. Fig. 7 shows the rate of steering error accidents by trip purpose and by time slot. Although a gap is found in the rate similar to Fig.6, the trend is similar for all groups with the rate being high in “driving”, “sight-seeing” and “visiting home town” for trip purpose. On the other hand, the rate is low for “business”, “commuting to work or school” and “shopping”, suggesting that steering error accidents occur more often on unfamiliar roads rarely driven on.

By time slot, the rate is more when driving in the midnight to early morning hours, with the rate high for young drivers of 24 years or under as compared to other age groups. This may be due to their tendency to over-speed when the traffic is less and to drive absent-mindedly paying less attention.

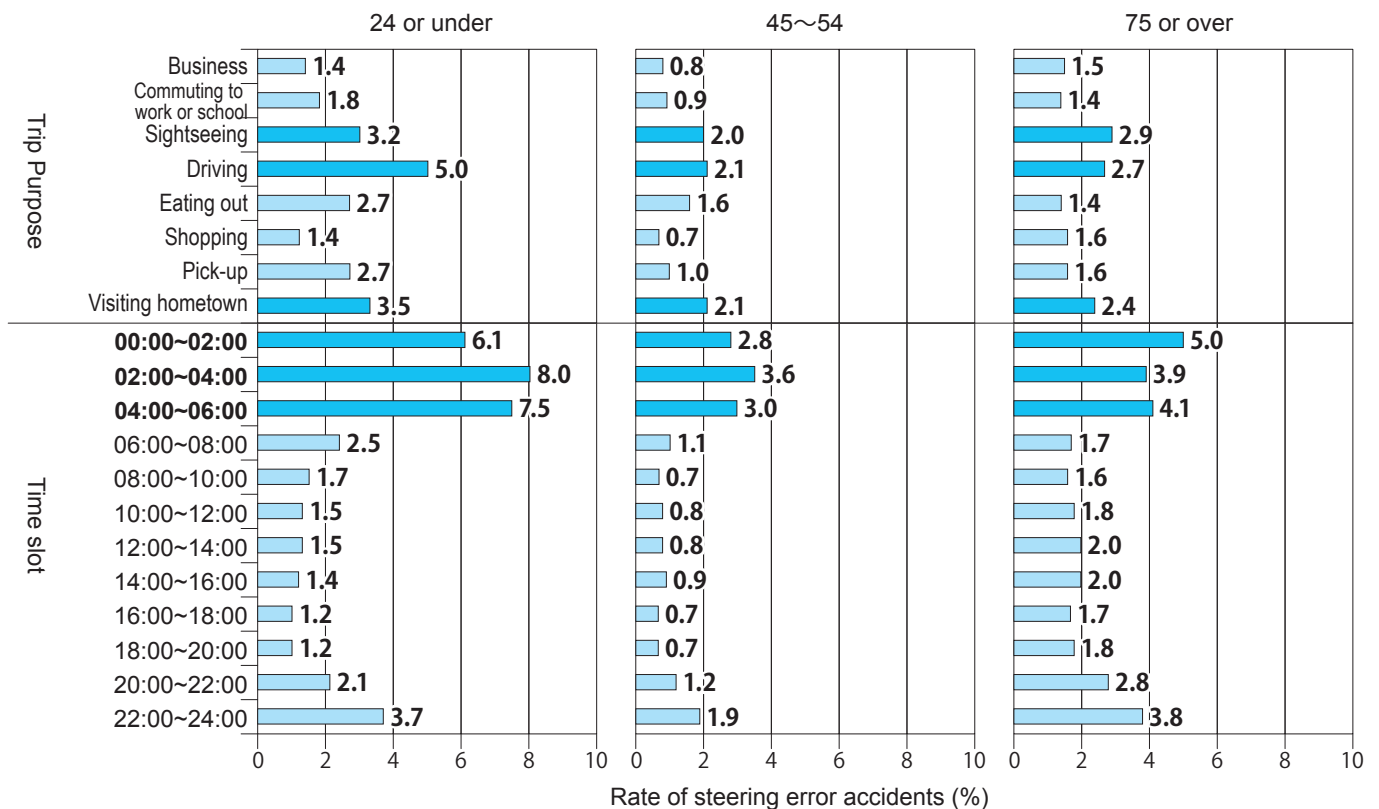


Fig.7 Rate of steering error accidents by trip purpose and by time slot (Year 2004-2013)

■ Pedal misapplication accidents

Fig. 8 shows the rate of pedal misapplication accidents by type of movement and by road type. Irrespective of the age groups, the rate is high for “starting up” under type of movement and “places other than roads” under road type. By age group, the rate is high for elderly drivers of 75 years or over as compared to other age groups, particularly while “reversing.”

Although not mentioned in the figure, the rate of drivers who caused fatal accidents by pedal misapplication by age groups shows that 39.6% of these accidents were caused by elderly drivers of 75 years or over.

*4: “Places other than roads” refers to the service areas off the highways etc., parking lots of shops, plazas and so forth.

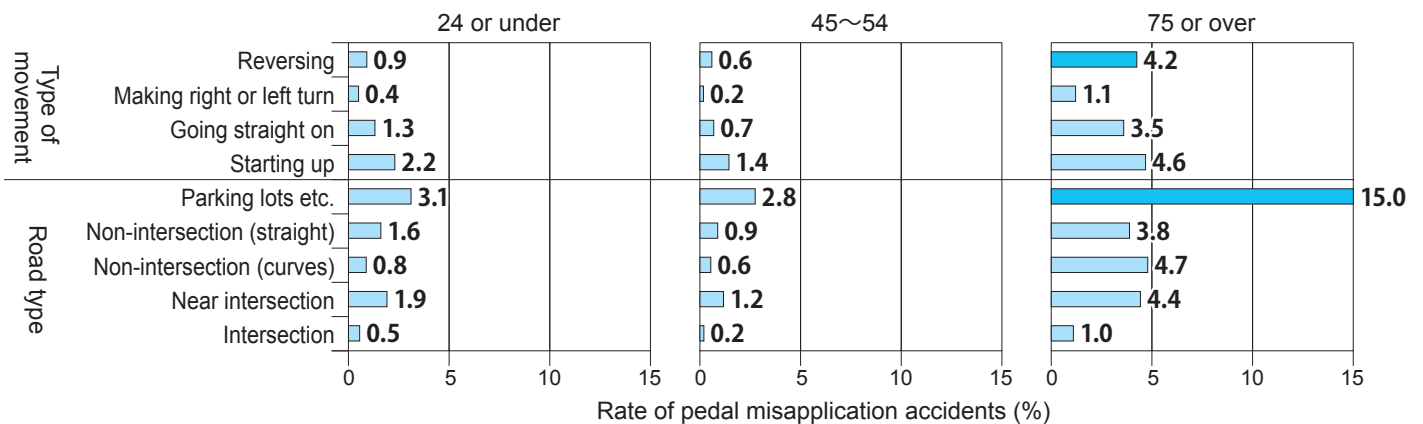


Fig.8 Rate of pedal misapplication accidents by type of movement and by road type (Year 2004-2013)

■ Braking error accidents

Fig. 9 shows the rate of braking error accidents by road surface condition. Regardless of the age groups, the rate is high for “pavement (icy)” and “pavement (snow-covered)”. Whereas by age group, young drivers of 24 years or under account for more accidents as opposed to the drivers of other age groups suggesting that young drivers are more likely to cause accidents due to braking error.

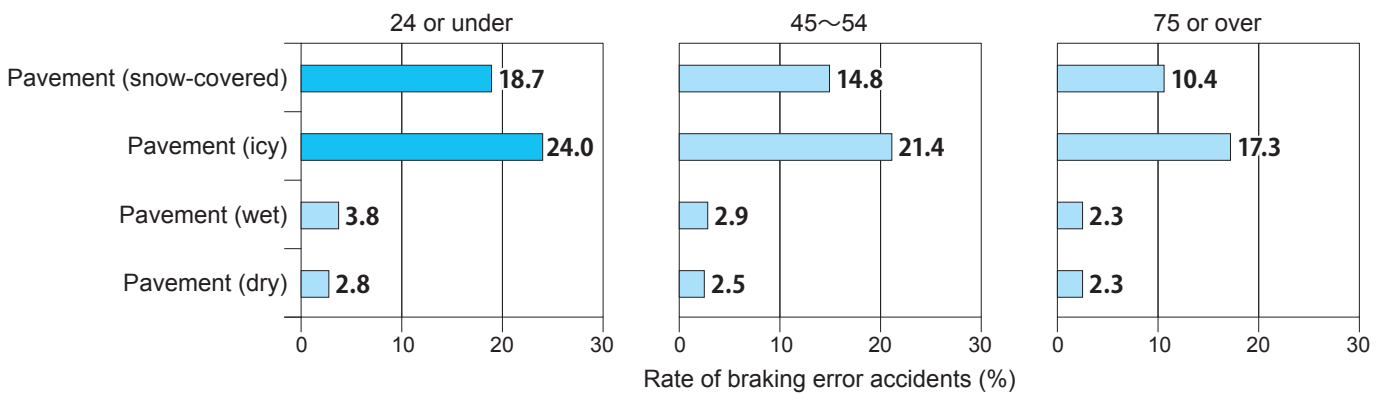


Fig. 9 Rate of braking error accidents by road surface condition (Year 2004-2013)

5 Human factors leading to driving operation error accidents

Earlier, we looked into the conditions that are likely to cause driving operation error accidents. Let us now analyze the human factors that influence operation errors based on our In-depth Case Studies (“microdata”) of 178 drivers who committed driving operation error accidents.

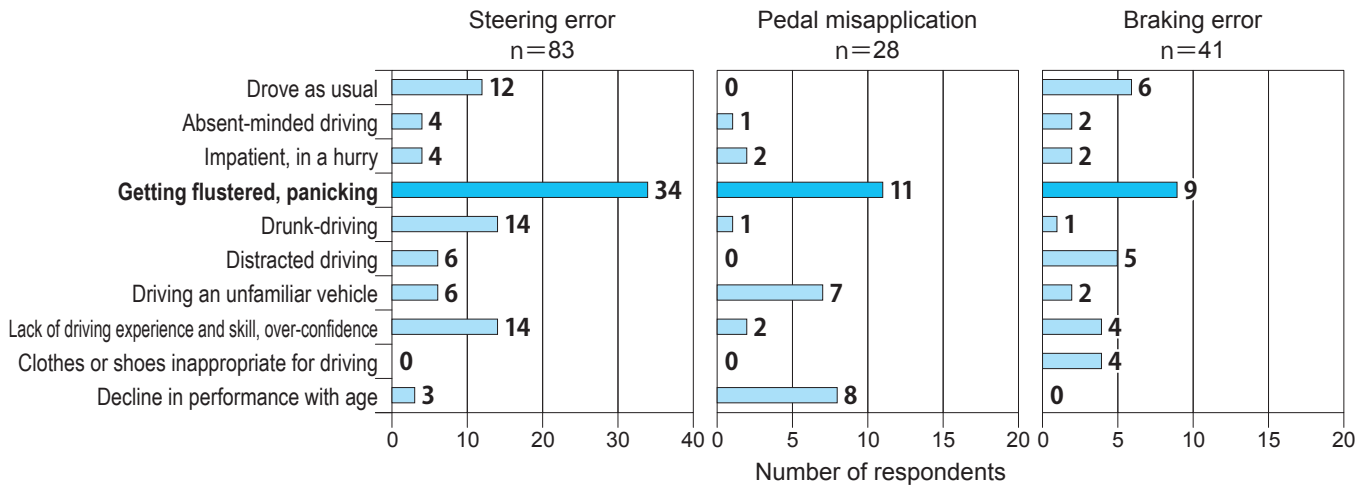
■ Human factors that influence driving operation errors

Fig.10 shows some selected human factors that prompted drivers to commit driving operation errors leading to accidents.

Apparently “getting flustered, panicking” is the major human factor that influences driving operation errors in drivers. As Fig.10 shows, many of the drivers when sensing some danger and trying to avoid it end up getting flustered and eventually panicky, causing them to commit driving operation errors.

Other human factors are as follows:

- (1) Steering error accidents are mainly caused by factors such as “lack of driving experience and skill, over-confidence”, “drunk-driving” and “drove as usual.”
- (2) Pedal misapplication accidents occur mainly due to factors like "decline in performance with age" and “driving an unfamiliar vehicle.”
- (3) Braking error accidents are caused due to factors like “drove as usual”, "distracted driving", “lack of driving experience and skill, over-confidence”, “clothes or shoes inappropriate for driving” among others.



Note: “drove as usual” refers to performing usual driving operations without giving heed to road surface condition and/or driving speed etc. For example, “Since the driver was driving the vehicle at a high speed on a rainy day and tried to change lane with the same steering operation as one does on a clear day, the vehicle skidded and collided with the guard rail” and so forth.

Fig.10 Human factors leading to driving operation error accidents (multiple responses)

Inadequate judgment and foresight that leads to driving operation errors

In what circumstances the drivers flustered and panicked and eventually ended up committing driving operation errors, let us find out. Fig.11 shows the judgment and foresight of drivers before the accident occurred. Judgment and foresight descriptions with 3 or less responses are not shown.

Many of the drivers committing driving operation errors were engaged in absent-minded driving, without foreseeing that the “curve may be too sharp” or “there may be oncoming or intersecting vehicles,” when they were driving on curved roads or at intersections. Also it is apparent that when the drivers perceive potential dangers like “collision with road-side structures etc.,” “felt will collide with vehicle coming straight from opposite direction”, “the leading vehicle slowed down or stopped”, and try to avoid them, they are prone to committing driving operation errors.

Nevertheless, getting flustered and turning panicky could have been avoided if they had driven at a proper speed conducive with the traffic environment and had engaged in predictive driving; thus preventing many of the driving operation error accidents.

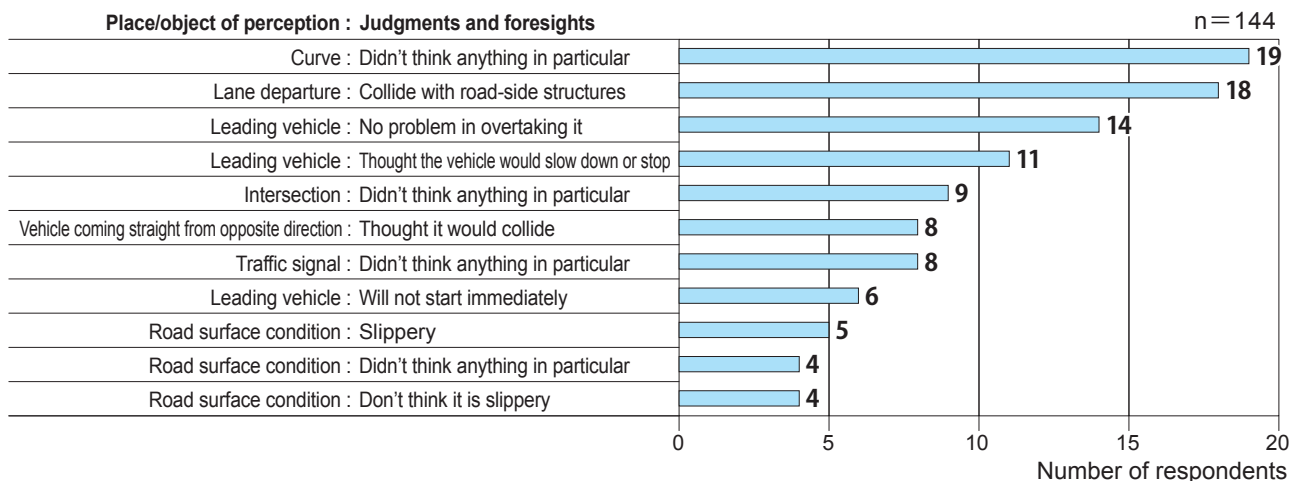


Fig.11 Judgment and foresight shown at the time of danger perception (multiple responses)

⑥ Conclusion

■ Characteristics of driving operation error accidents

- (1) Driving operation error accidents are common in young drivers of 24 years or under and elderly drivers of 75 years or over.
- (2) Steering error is more common when driving on curves and at high speeds. Also, it is more prevalent in young drivers of 24 years or under with the trip purpose of driving and during the time slot of midnight to early morning hours.
- (3) Pedal misapplication is more often committed by elderly drivers of 75 years or over during starting up or reversing the vehicle at parking lots, etc.
- (4) Braking error is more prevalent on snow-covered roads and icy roads, regardless of the age group.
- (5) In-depth study indicates that many of the drivers who committed driving operation error accidents were engaged in absent-minded driving, thereby unable to judge and foresee dangers at curved roads and intersections properly, causing them to fluster and turn panicky on an unexpected event.

■ How to prevent driving operation error accidents

- (1) Always drive at a speed conducive with the traffic conditions and keep safe distance from other vehicles so that you can deal with an unexpected event. This will ensure that you do not fluster and turn panicky, thus preventing driving operation error accidents.
- (2) It is not necessary that the traffic condition will remain the same at all times. Even on familiar roads, do not resort to absent-minded driving and always drive taking into account the traffic and road surface conditions. Ensure cautious driving particularly on unfamiliar roads.
- (3) Young drivers are less experienced and do not have sufficient driving skills. Do not be over-confident and engage in overspeeding and unreasonable overtaking.
- (4) Elderly drivers have grown weaker in their physical abilities and are not able to operate the vehicle in response to sudden change in traffic conditions. Take your time when starting and reversing the vehicle especially at parking lots while properly checking the positions of pedals and gear lever, so as not to end up committing pedal misapplication.

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