イタルダ インフォメーション

ITARDA INFORMATION
交通事故分析レポート No.110

Special feature

Angle collisions leading to fatal and serious injuries of old-old bicycle riders

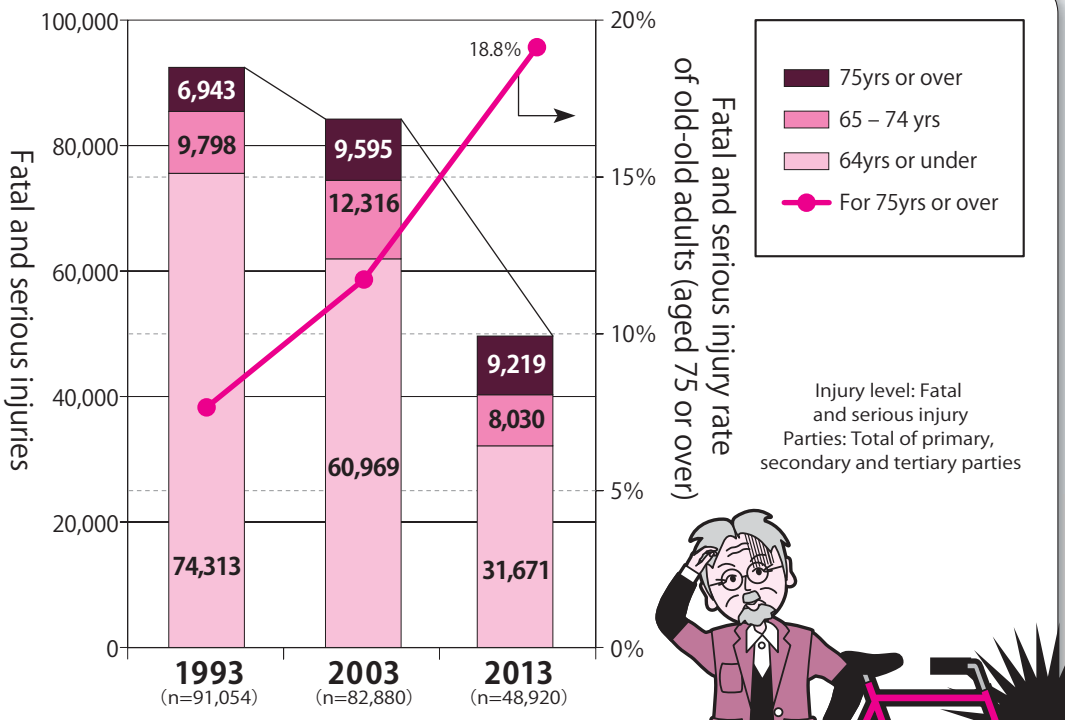
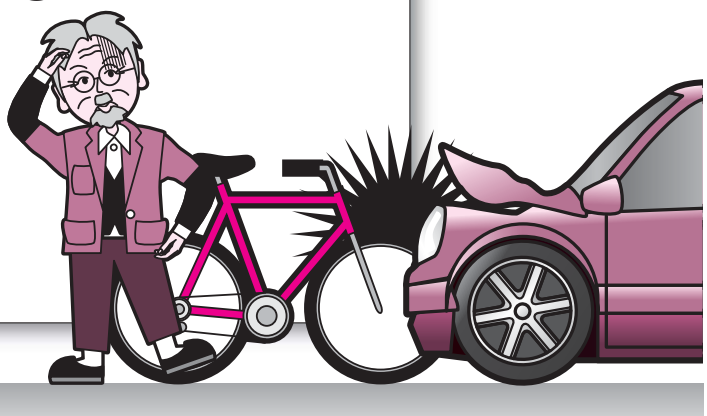


Fig.1 Change in fatal and serious injuries and rate of old-old adults



1 Introduction

The fatal and serious injuries of 2013 CY stand at 48,920 people. Although this number has reduced to half in the past 20 years, the rate of fatal and serious injuries of old-old adults aged 75 years or over is particularly high at 18.8% of the total in 2013 (Fig.1), which is over 12.3% of the composition rate of the old-old population. Analyzing the situations and circumstances where these old-old adults sustained fatal and serious injuries, apparently, “while walking” tops the list, followed by “while riding bicycles” (Fig.2). The accident statistics of elderly pedestrians have been covered in our previous issues of ITARDA Information[1)2)3)], so that in this issue we will focus on the accidents of bicycle riding old-old adults.
When seen by accident type, old-old bicycle riders were involved in “angle collisions” in more than half of the total (Fig.3) and in 90% of the cases, the other party involved was four-wheeled vehicles. Therefore, we will focus our study on the “angle collisions of old-old bicycle riders with four-wheeled vehicles leading to fatal and serious injuries”.

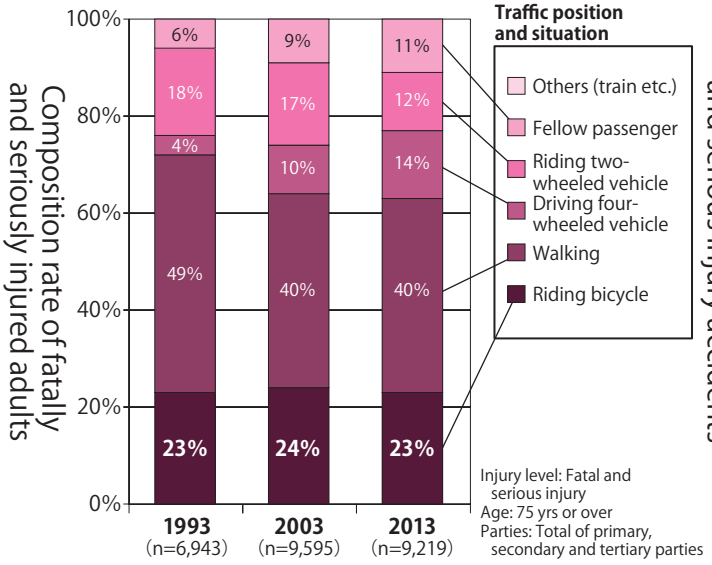


Fig.2 Classification of fatally and seriously injured adults by their traffic position and situation

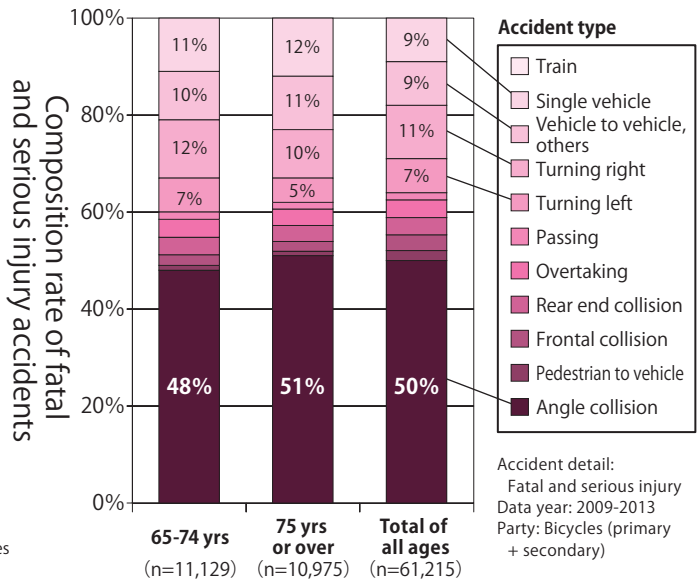
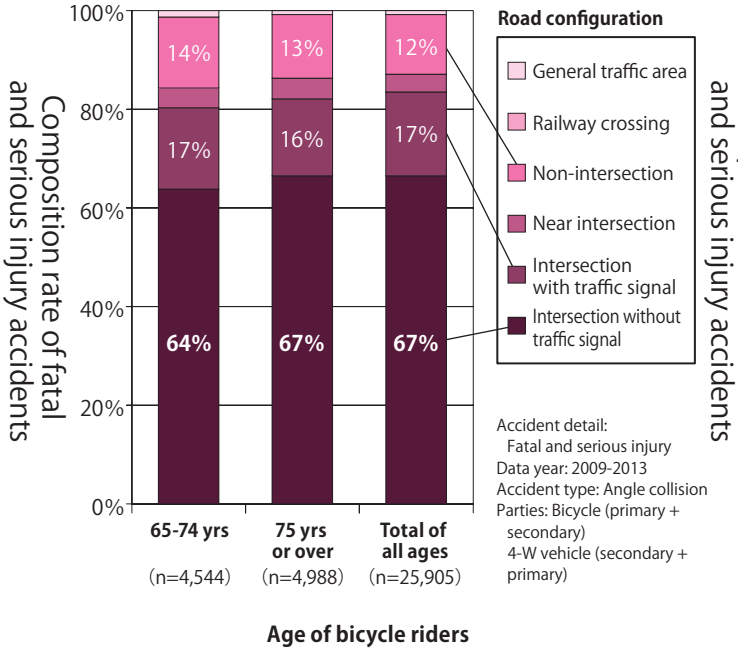


Fig.3 Type of fatal and serious injury accidents of bicycle riders

2 Accident characteristics
(Angle collisions of old-old bicycle riders leading to fatal and serious injuries)

The classification of the place of occurrence of fatal and serious injury accidents of old-old bicycle riders by road configuration (with or without traffic signals for intersections) indicates that about 70% (Fig. 4) of the old-old bicycle riders met with accidents at “Intersections without traffic signals,” same as the riders of other age groups. Further, on the basis of halt regulation at intersections[*1] (Fig.5)[*2], accidents occurred more often at "intersections without traffic signal and with halt regulation for bicycles" in the case of 40% of the old-old drivers. Thus, using this composition rate, the order of fatal and serious injuries is, (1st) intersection without traffic signal (no halt regulation for four-wheeled vehicle or bicycle[*3]) , (2nd) intersection without traffic signal (halt regulation only for bicycle), (3rd) intersection with traffic signal and (4th) non-intersection; together these four comprise 86% of the total (Fig.6).
Further, we compared the accident data of old-old bicycle riders with other age groups (average of all ages) on the basis of the above 4 patterns by “time” and “place” of occurrence (Table 1). Sparing the details, the comparison shows that accidents involving old-old riders occurred more often in the morning hours at non-urban areas, especially within the 500 meter-area around their homes. Also, the rates of other party of four-wheeled vehicle being a commercial vehicle and driven by elderly drivers were high. Moreover, as seen in Table 2, old-old bicycle riders meet with fatal and serious accidents when they violate traffic rules (such as “obstructing priority traffic”, “not stopping at halt signs”, “ignoring traffic signals”, “violating crossing prohibition”, and so on) when the four-wheeled vehicle parties are moving straight or crossing without expecting any such thing, clubbed with the latter’s “failure to pay attention forward (intrinsic/extrinsic factors)” and “failure to observe surrounding traffic movements”.
In chapter 3, typical case examples of the four aforementioned patterns of accidents are described.



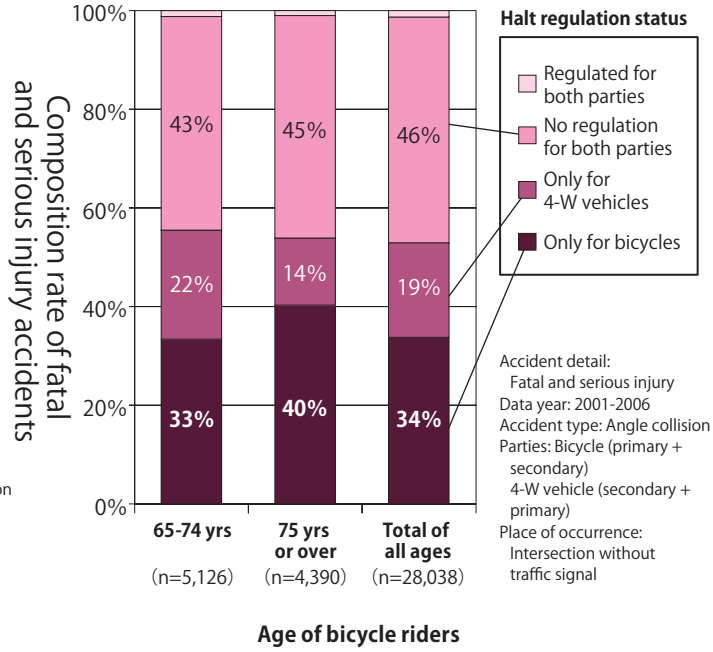


Fig.4 Rate of accidents by road configuration

Fig.5 Rate of accidents by halt regulation status

*1: If there is a halt sign before an intersection, one should stop just before the stop line (Article 43 of Road Traffic Law).
*2: As the data for "with or without halt regulation" has been omitted in the accident database of National Police Agency since 2007, the data for 2001 to 2006 is provided here.
*3: "No halt regulation for both parties" shall correspond to those intersections etc. on roads with priority lane on one side or on wide roads, where there are no halt signs for both parties.

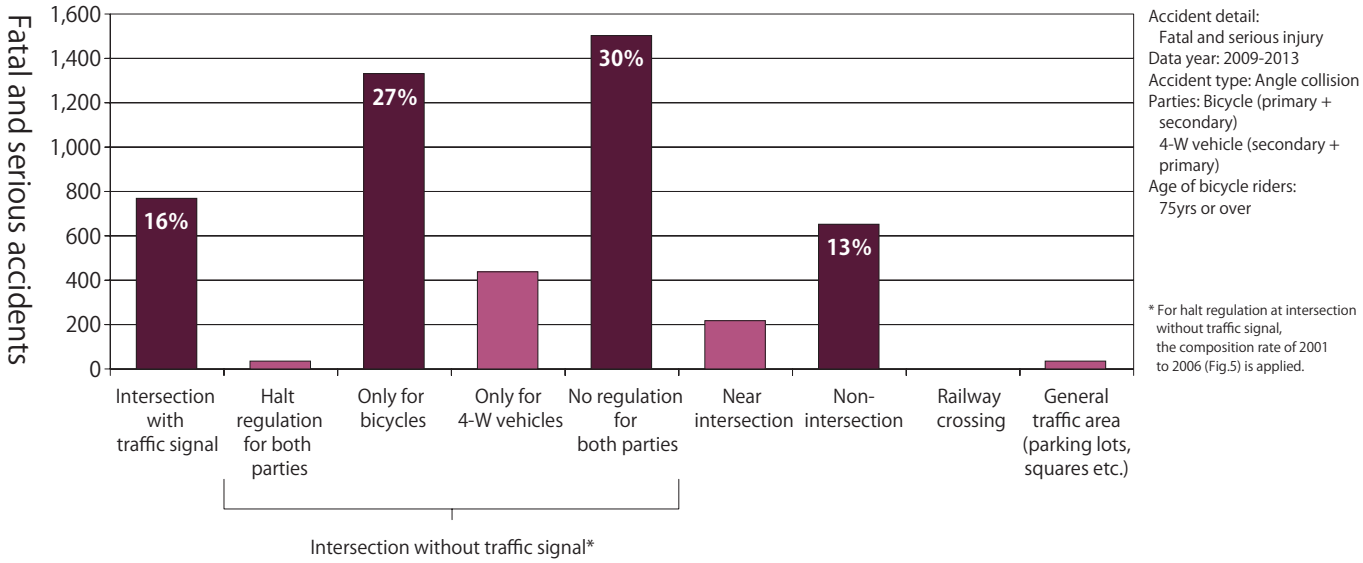


Fig.6 Accidents by road confguration and halt regulation status

Table 1 Characteristics of old-old bicycle riders in angle collisions leading to fatal and serious injuries

			Road configuration			
			(1) Intersection without traffic signal (no halt regulation for 4-W vehicle or bicycle)	(2) Intersection without traffic signal (halt regulation only for bicycle)	(3) Intersection with traffic signal	(4) Non-intersection
Characteristics more common in old-old riders than other age groups	Common characteristics regardless of road configuration of accident site		Time of occurrence: 8:00 a.m. to 12:00 noon Place of occurrence: Non-urban area within 500 meter area around home Other party: Commercial vehicle, older drivers of 65yrs or over Accident situation: Occurred when the old-old bicycle rider was crossing and the 4-W vehicle failed to pay attention forward (intrinsic/extrinsic factors) and failed to observe surrounding traffic movements			
	Peculiar characteristics by road configuration of accident site	Movement type of 4-W vehicle	Driving with constant high speed		Accelerate, starting up (low speed zones)	Driving with constant high speed
		Violation, human factors of old-old bicycle riders	Obstruct priority traffic	Not stopping at halt signs	Ignore traffic signals	Violate crossing prohibition
Typical case examples described in chapter 3			Case example-A	Case example-B	Case example-C	Case example-D

Table 2 Occurrence structure of angle collisions of old-old bicycle riders leading to fatal and serious injuries

Status of 4-W vehicle drivers	Status of older bicycle riders
Background/factors ・Self-conceited and negligent driving on accustomed roads	**Background/factors** ・Usually make dangerous moves; overconfidence/dependent on other party ・Deterioration of physical and mental abilities with age
Background/factors ・Was driving as usual ・Realize that he/she failed to pay attention forward (intrinsic/extrinsic factors) and failed to observe surrounding traffic movements, but never expected that the bicycle would come crossing.	**Standpoint of older bicycle riders** ・Was only acting usual ・Never expected that the vehicle would come closer! I did check safety properly…It was alright until now… ・Unbelievable, how come the vehicle did not take notice of me!

Result
・Owing to differences in traffic standpoints and individual attributes of the parties, and without really understanding the other party's practical sense and realities, either party never expected that the other party would do something impractical, which finally led to fatal and serious accidents.

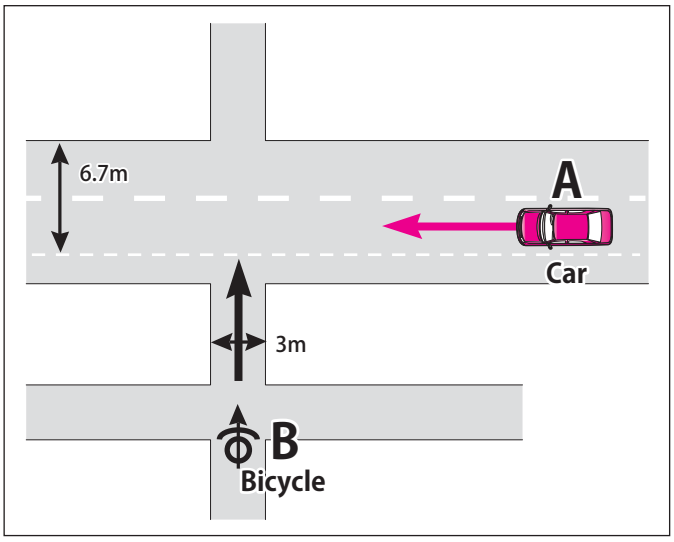
❸ Typical case examples of accidents

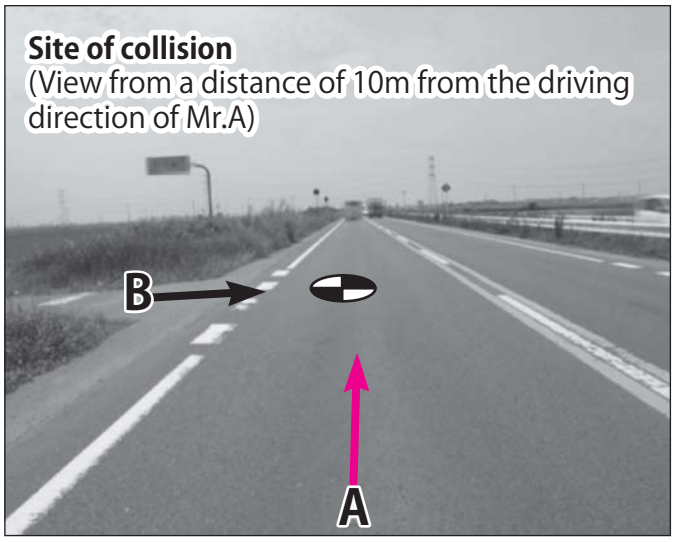
■Case example-A: Accident at intersection without traffic signal (no halt regulation for bicycle and four-wheeled vehicles)

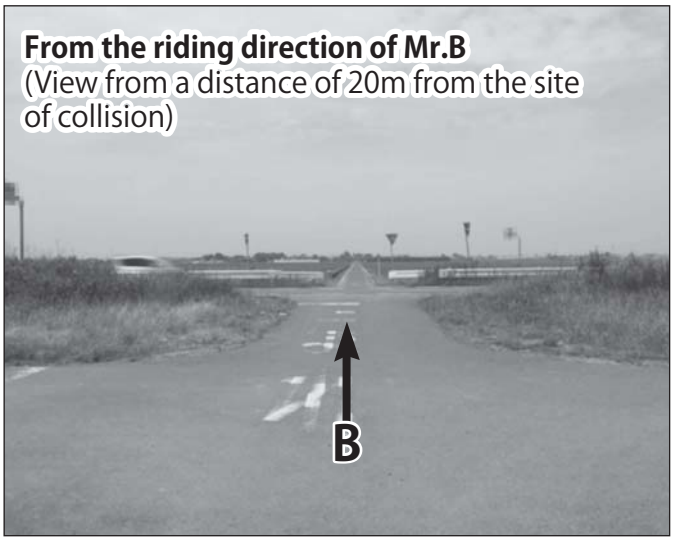
The accident occurred at an intersection without traffic signal of roads with widths 6.7m and 3m. Mr.A in his early sixties was driving a car at 60km/h on a priority road. When he approached an intersection without traffic signal all of a sudden a bicycle ran into his car from left. In a fluster Mr. A pressed the brake, but it was too late and ended in an angle collision with the bicycle (Photo 1). Mr.A drove on this road many times a week and though he knew the existence of intersections with obstructed view, but seldom did he encounter any vehicle crossing the road. Also, because he drove on the priority road, he never expected any bicycle to run into his car.

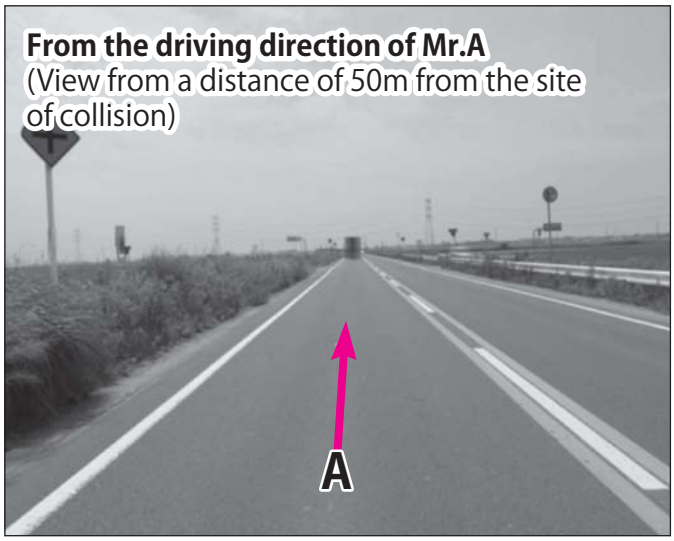
On the other hand, Mr.B in his early eighties was taking a stroll on his bicycle. Although the details are not available, there were bushes on either side of the road he was on and he seemed to have crossed the road just before Mr.A, without adequately checking safety.

Though he was driving on the priority road, had Mr.A been more careful about the possibility of traffic inflow from crossing roads, he could have perceived Mr.B's movement ahead of time. Meanwhile if Mr.B had stopped at the intersection and checked the safety on both sides before proceeding, he could have avoided this angle collision.









Date and time of accident: June, 15:00 hours, clear and bright day
Place: Intersection of general road (6.7m) and municipal road (3m)
Mr.A: in his early sixties, driving a sedan car with no accident or violation record in the past 3 years.
Mr.B: in his early eighties, sustained serious injuries (traumatic pneumothorax, fractured thighbone etc.), did not possess a driver's license.

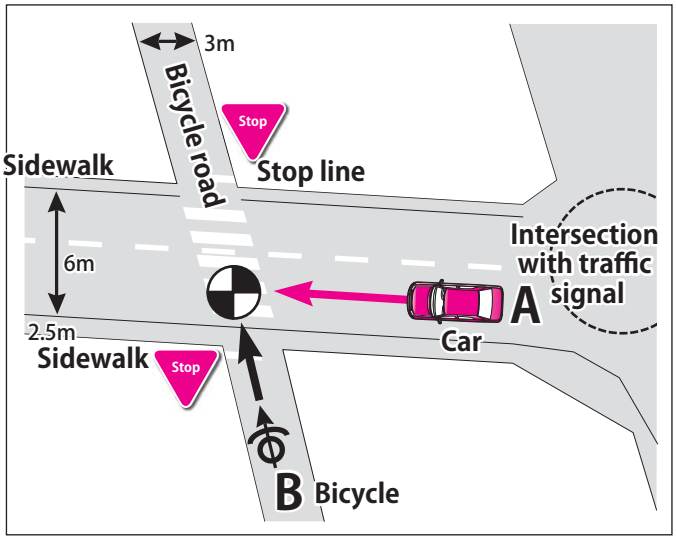
Photo 1: Accident outline of case example-A

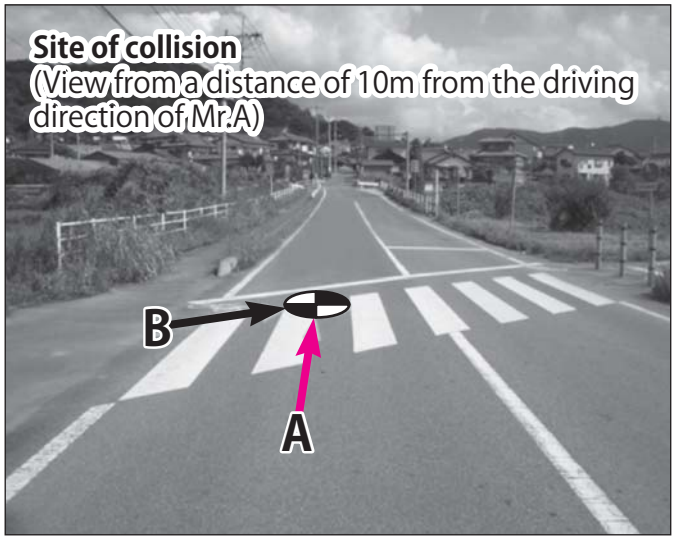
■Case example-B: Accident at intersection without traffic signal (halt regulation only for bicycle)

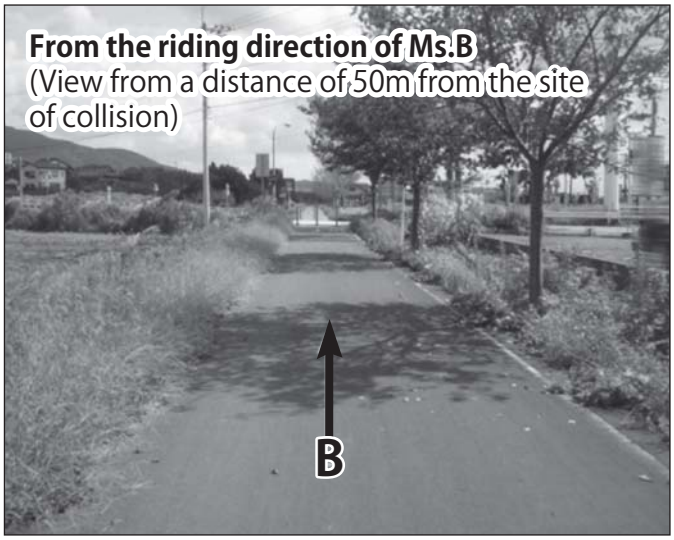
This accident occurred at an intersection without traffic signal of a 3m wide bicycle-only road and a 6m wide prefectural road (Photo 2). Mr.A in his early seventies was driving a car on the priority road at a speed of 50 km/h overshooting the speed limit of 40 km//h and approached the intersection. All of a sudden Ms.B, in her late seventies who was riding a bicycle ran into his car from left. Mr.A applied a sudden brake but just could not avoid the collision. Mr.A, who was the leading vehicle, had stopped at the previous intersection with traffic signal and as soon as the signal turned green, he rapidly accelerated his car to 50 km/h. Although he was aware of the existence of a crossing road next, he never expected a bicycle to just run into him as he was driving on a priority road.

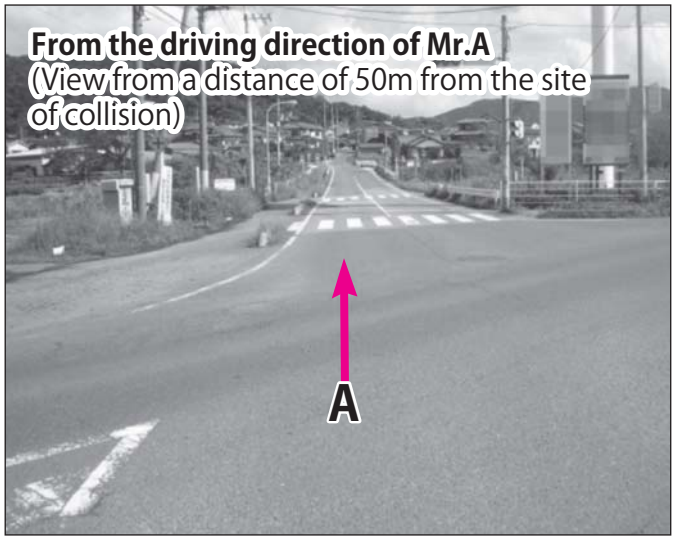
Whereas Ms.B who happened to check for any approaching vehicle on her left side which she had an open view of, did not stop as no vehicle was coming from that side.

Granting that Mr.A was driving on the priority road, had he observed the traffic rules (speed limit of that zone) and checked safety around the intersection while transiting the pedestrian crossing, he could have noticed Ms.B who was not likely to stop her bicycle. As for Ms.B, even if the traffic at the intersection she was about to pass was sparse, had she stopped her bicycle and checked safety on both sides before proceeding, she could have avoided this angle collision.









Date and time of accident: July, 08:00 hours, cloudy but bright day
Place: Intersection without traffic signal of prefectural road (6m) and bicycle road (3m)
Mr.A: in his early seventies, driving a sedan car with no accident or violation record in the past 3 years.
Ms.B: in her late seventies, sustained serious injuries (cerebral damage), did not possess a driver's license, was riding an electric assist bicycle.

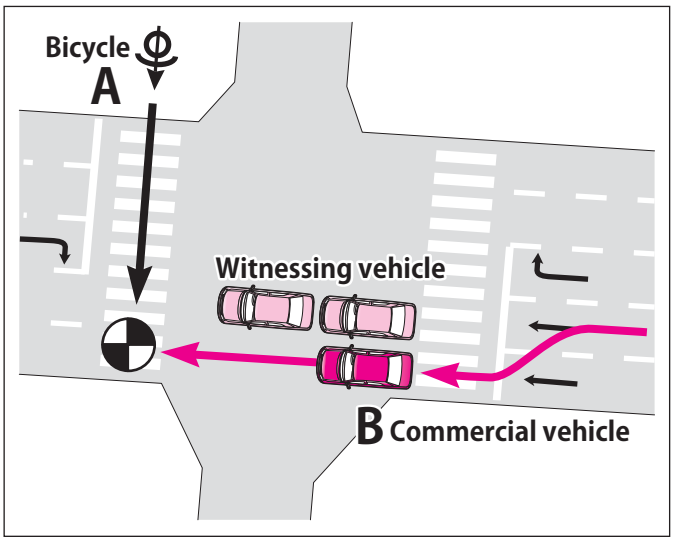
Photo 2: Accident outline of case example-B

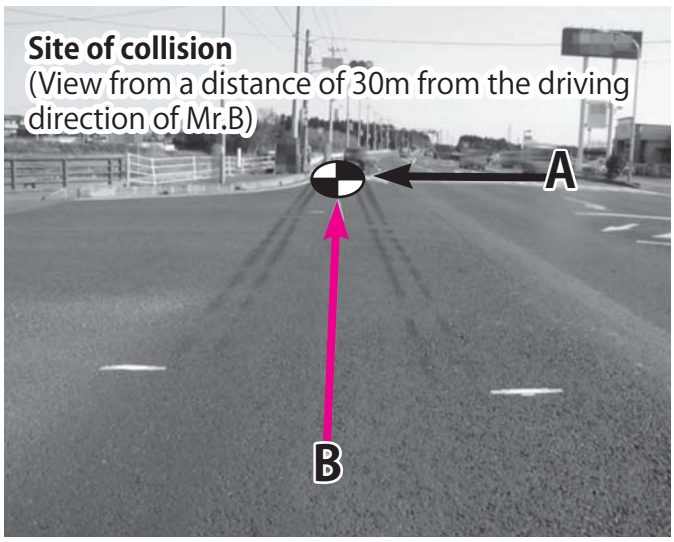
■Case example-C: Accident at an intersection with traffic signal

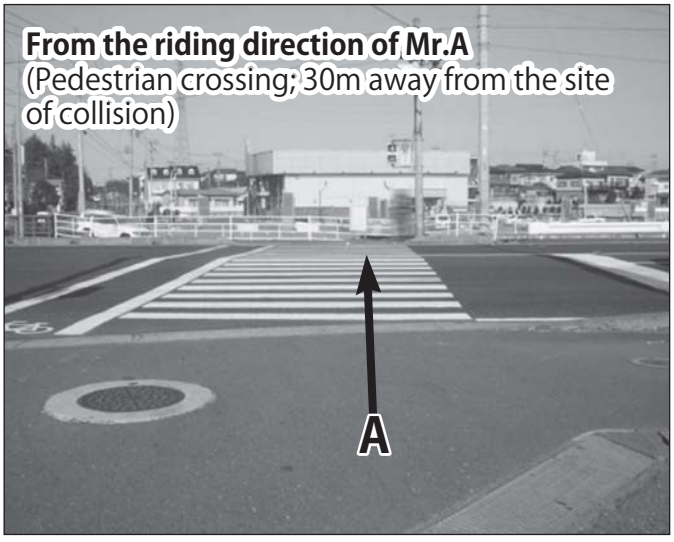
This is a case example of an angle collision that occurred at an intersection of a national road of width 15m (Photo 3). Mr.B who was in his late forties was driving a commercial vehicle on the second lane of the road. He had noticed a few vehicles waiting at the traffic signal ahead on the same lane as his. Seeing the signal turning green just about the time he was approaching the intersection and that the first lane was vacant, he changed the lane and speeded through the intersection. Suddenly he noticed a bicycle crossing from his right on the pedestrian crossing. Although he applied brake, it was too late and he crashed into the bicycle. He never imagined that a bicycle would run into him through the pedestrian crossing ignoring the traffic signal.

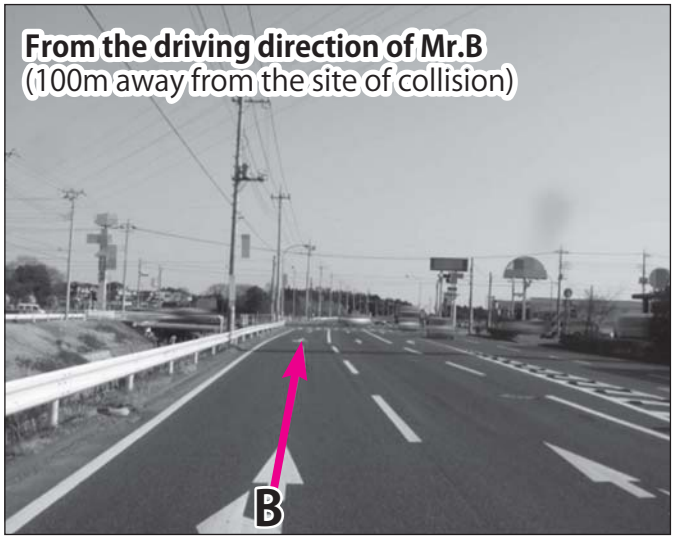
On the other hand, Mr.A (in his late seventies) who was riding the bicycle, died in this accident. According to a witness, apparently Mr.A had entered the intersection when the signal was red. As the signal had just turned green for the traffic on his right and could see that they had not yet started moving, he may have hoped that he could somehow cross the road.

The accident could have been prevented if Mr.A had inculcated the habit of intently confirming the status of the traffic signal and “sufficiently wait when the signal is red”. Further, even if he was passing through the intersection when the traffic signal was green, had Mr.B been careful about any sudden crossing by a bicycle or had he anticipated that there could still be bicycles or pedestrians who had not finished crossing the road at the change of the signal, this accident would not have occurred.









Date and time of accident: February, 11:00 hours, clear and bright day
Place: Intersection with traffic signal of a national road (15m wide)
Mr.A: in his late seventies, riding the bicycle, died, did not possess a driver’s license.
Mr.B: in his late forties, driving a commercial vehicle with no accident or violation record in the past 3 years.

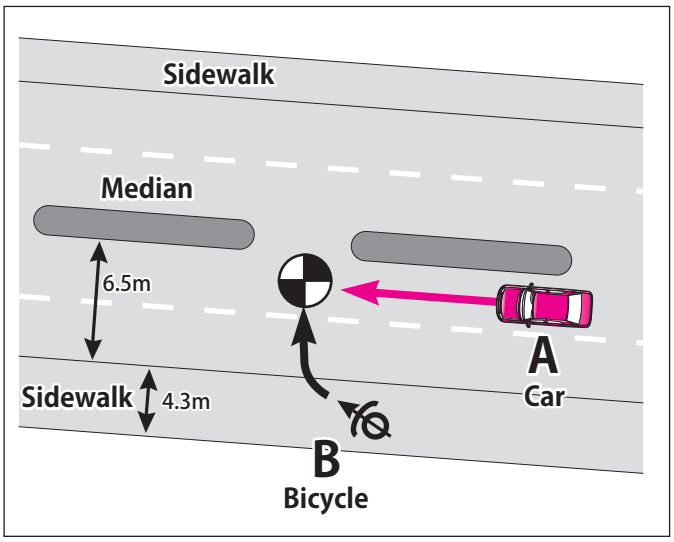
Photo 3: Accident outline of case example-C

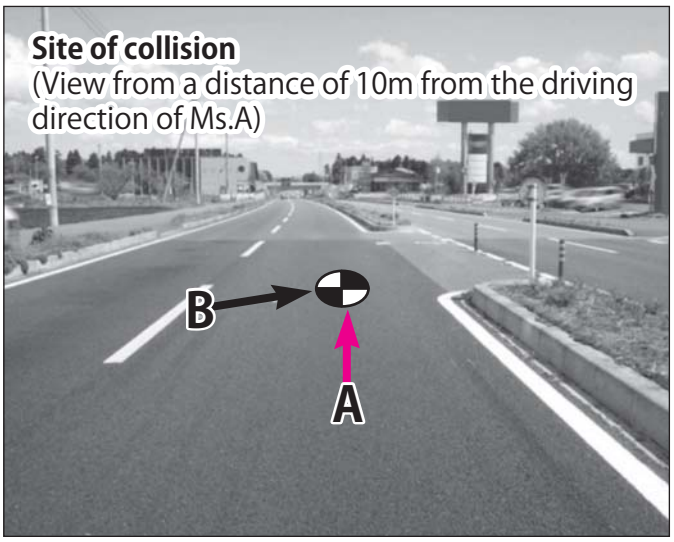
■Case example-D: Accident at non-intersection

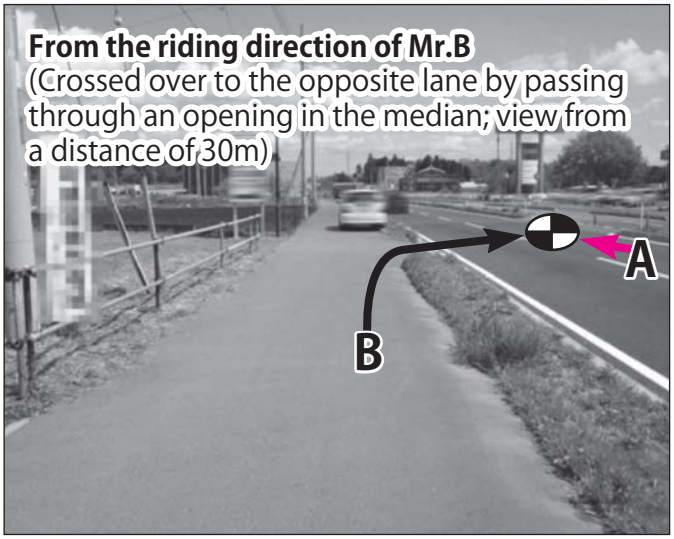
In this case example, an angle collision that occurred at non-intersection, with a road width of 13m (Photo 4) is explained. Ms.A, in her early thirties was driving a car on a priority road at a speed of 50km/h. The speed limit in this zone was 60km/h. She collided with Mr.B, in his late eighties who was riding a bicycle and crossing from the left side of Ms. A. Although Ms.A had noticed Mr.B, but as she never expected him to turn up on the road, she took her attention off him. Before she could realize, Mr.B had already approached near the middle of the road. She quickly applied the brake, but it was too late and she collided with Mr.B.

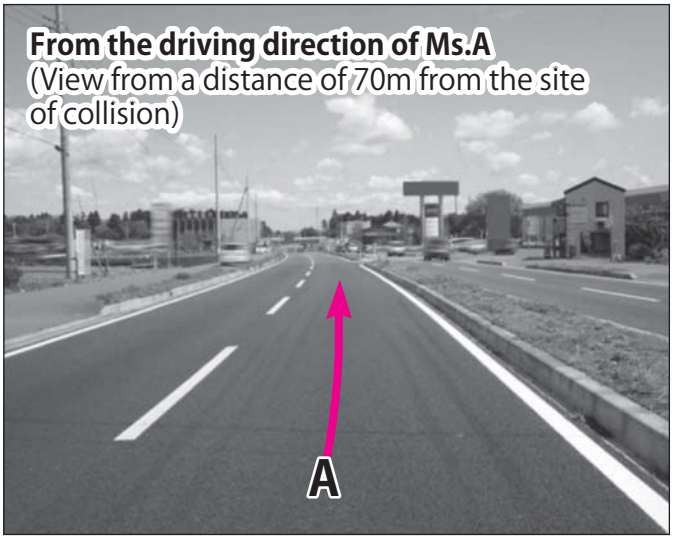
Meanwhile, Mr.B had stopped at the sidewalk and confirmed that there were no approaching vehicles on both sides before he entered the road. Thereafter, it was when he had already entered the second lane of the road, that he noticed the approaching car of Ms.A. Even though the eyesight of Mr.B is good in both eyes, he may have been unable to accurately recognize the approaching car on his right side from a wide background (deterioration of kinetic vision and depth perception), or it may be possible that his visual field was constricted due to old age.

In this case example, had Ms.A been cautious about the movements of Mr.B, and had Mr.B been able to correctly recognize the approaching vehicle of Ms.A, he would have restrained himself from crossing the road, and thus this accident could have been prevented.









Date and time of accident: April, 08:00 hours, clear and bright day
Place: Non-intersection of a major local road (13m)
Ms.A: in her early thirties, driving a minivan with no accident and one violation record in the past 3 years.
Mr.B: in his late eighties, sustained serious injuries (fractured humerus); did not possess a driver's license.

Photo 4: Accident outline of case example-D

4 Conclusion

The typical characteristics of the “angle collisions of old-old bicycle riders with four-wheeled vehicles leading to fatal and serious injuries” as compared to riders of other age groups are as follows.

- More likely to occur in the morning hours and in non-urban areas, and the rate of accidents occurring within 500m of their homes is high.
- Old-old bicycle riders tend to meet with fatal and serious accidents when they violate traffic rules such as “obstructing priority traffic”, “not stopping at halt signs”, “ignoring traffic signals”, “violating crossing prohibition”, and so on when the four-wheeled vehicle parties are driving without expecting any of these, clubbed with the failure to pay attention forward and failure to observe surrounding traffic movements by the latter.

Such fatal and serious accidents may be prevented by being cautious of the following.

Four-wheeled vehicle drivers:

- While driving on familiar roads if there are areas of concern such as intersections with obstructed view etc., they should control their speed anticipating any unexpected movement of the elderly people.
- If they notice any elderly person riding a bicycle near their driving direction, they should control their driving speed and temporarily turn on the headlights even if it is daytime, thus making themselves more conspicuous.

Elderly bicycle riders:

- Should become more safety-conscious by regularly inspecting the risky areas of the roads they frequent and “refrain from crossing big roads and instead modify their routes to where there are traffic signals,” and “at intersections with obstructed view, they should get down from the bicycle and check safety before proceeding”. It is also advisable to take time with family to check on the usual traffic behavior together.
- Eyesight tends to weaken with age before one is aware of it [4]. Therefore it is advisable to get regular eye check-ups and be aware of one’s condition that will make one more prudent in his/her actions.
- Should absolutely refrain from committing violations such as “obstructing priority traffic”, “not stopping at halt signs”, “ignoring traffic signals”, etc.
- Even at daytime turn on the bicycle light to make one more conspicuous to others.

In order to build a safe and secure society for very elderly people, active social participation is necessary. Social systems such as driving courses for the elderly and regional activities shall be proposed in a planned manner with extensive revision, consideration and thoughtfulness going into bicycle safety (including electric assist bicycles) for elderly riders, both from the standpoint of bicycle riders as well as the four-wheeled vehicle drivers. In addition, social initiatives that help the elderly riders in realizing the decline in their physical abilities especially kinetic vision, depth perception and eyesight [5], are also necessary.

(Takashi Takemoto)

References:

1) ITARDA information (2010); Senior pedestrian accidents, 10.
2) ITARDA information (2011); Nighttime fatal accidents involving senior pedestrians, 02-87.
3) Kenji Funayama (2011); Senior pedestrians: Analysis of accidents while crossing the road; http://www.itarda.or.jp/ws/pdf/h23/14_03oudan.pdf
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