

# ITARDA INFORMATION

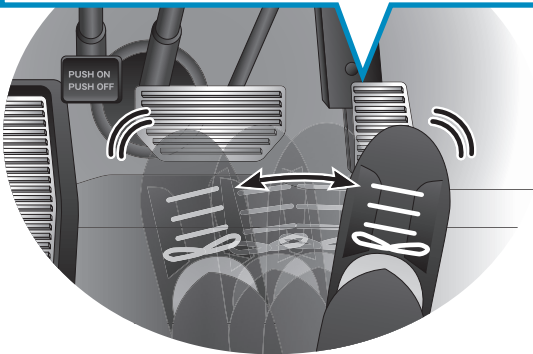
## 交通事故分析レポート No.137

Special  
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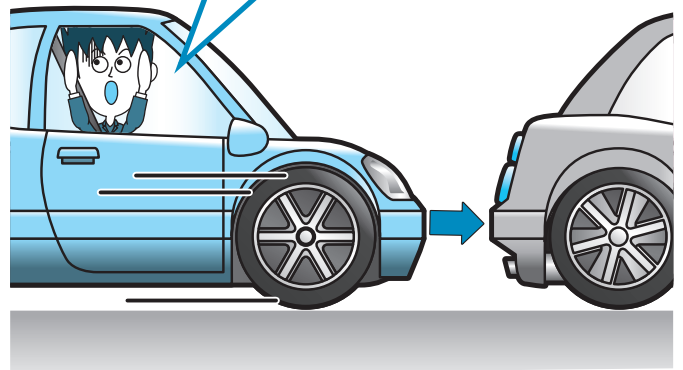
### Accidents due to pedal misapplication in four-wheeled vehicles

~ Lessons from accident case studies  
on accelerator and brake pedal misapplication ~

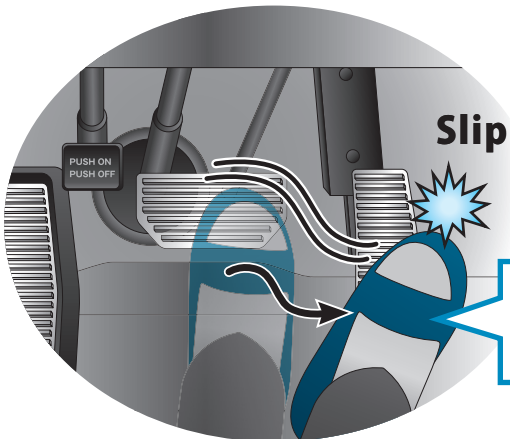
Pedal misapplication when  
frequently switching between pedals



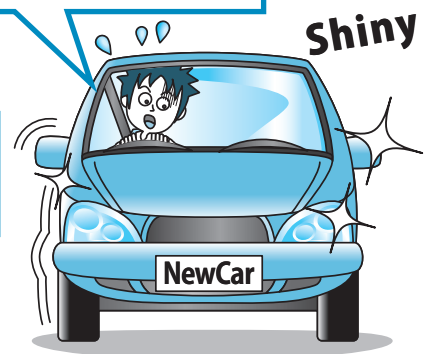
Pedal misapplication  
due to driver panic



Pedal misapplication in new  
or unfamiliar vehicles,  
such as loaner vehicles



Pedal misapplication due  
to improper footwear



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## 1 Introduction

In recent years, major accidents have occurred due to the misapplication of the accelerator pedal (hereinafter, “accelerator”) and brake pedal (hereinafter, “brake”) by drivers of four-wheeled vehicles. These accidents have generated a great deal of social interest and attention is now focused on urgently enacting measures to prevent such accidents.

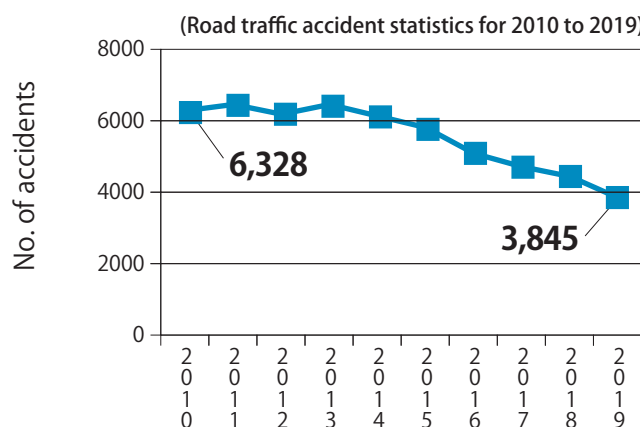
Figure 1 “Trends in casualty accidents due to accelerator and brake pedal misapplication in which a four-wheeled vehicle is the primary party” shows that the number of pedal misapplication accidents over a 10-year span from 2010 (6,328 accidents) to 2019 (3,845 accidents) decreased by 40%. However, about 10 such accidents still occur on a daily basis, meaning effective measures are still required.

With these circumstances in mind, recent research performed by means such as analyzing road traffic accident statistics has revealed the following about accidents due to accelerator and brake pedal misapplication in four-wheeled vehicles.

- Accident rates for older and younger drivers are high.
- Such accidents often occur in non-intersections, parking lots, etc.
- Such accidents often occur when moving straight or starting up.
- Such accidents are often single-vehicle accidents (e.g., collisions with parked vehicles or roadside structures).

However, despite our having gained an understanding of the approximate realities surrounding pedal misapplication accidents, a great deal is still unknown regarding the causes and processes of such accidents.

For this reason, it is the objective of this paper to learn when and how pedal misapplication accidents by four-wheeled vehicles are occurring by using specific examples obtained from detailed investigative data (hereinafter, “micro data”) held by ITARDA on traffic accident cases.



**Fig. 1 - Trends in casualty accidents due to accelerator and brake pedal misapplication in which a four-wheeled vehicle is the primary party**

## 2 Overview of Accident Case Studies

In micro data for 2005 to 2017, the number of casualty accidents in which the driver of a four-wheeled vehicle was the cause totaled 2,717 accidents. Of these, 30 were pedal misapplication accidents where the driver accidentally pressed the accelerator instead of the brake. Of these 30 accidents, the majority occurred under the following circumstances.

- When attempting to change directions or park in parking lots or parking garages (8 cases)
- When approaching stopped vehicles at a signalized intersection from behind (5 cases)
- When attempting to enter the roadway from a roadside business (4 cases)
- When attempting to enter a non-signalized intersection (4 cases)
- When proceeding through a curve (2 cases)

In the next section, we will look at observations made using accident case studies in which the various elements that lead to pedal misapplication accidents in each of the above circumstances can be seen.

## 3 Lessons from Accident Case Studies

Figures 2 through 6 in each of the accident case studies show the steps of the accident occurrence process.

The occurrence processes shown here are reenactments based on photos and outline drawings of accident scenes, as well as testimony from parties concerned, etc.

## ◆Accident case study 1 “When changing directions in a parking lot (Fig. 2)”

Driver: Driver A (female, early 40s, medium-sized passenger car with automatic transmission)

[Accident occurrence process]

- ① When reversing her vehicle in the parking lot of a roadside business, Driver A attempted to back up quickly to a location where an acquaintance outside the vehicle was waiting. When doing so, she failed to check the area behind her before pressing the accelerator harder than usual, causing her to crash the rear of her vehicle into a utility pole.
- ② After colliding with the utility pole, Driver A attempted to move the vehicle forward and away from the utility pole.
- ③ After moving the vehicle forward, Driver A accidentally pressed the accelerator when attempting to stop by pressing the brake pedal, causing the vehicle to accelerate suddenly in the forward direction and crash into the outside wall of a building. Driver A suffered minor injuries, with her passenger suffering serious injuries.

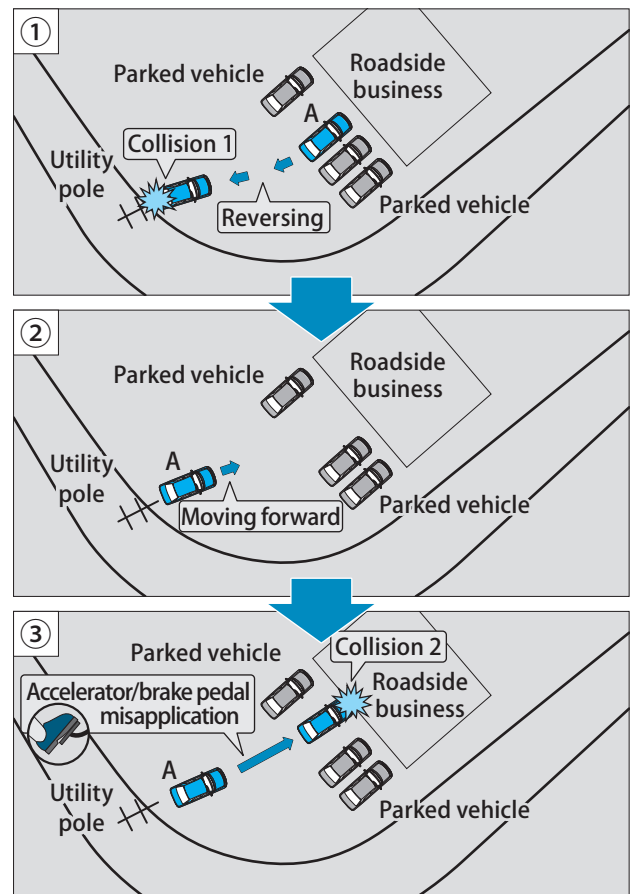


Fig. 2 - When changing directions in a parking lot

[Observations]

- The process in which pedal misapplication occurred was: Reverse at low speed → (Collision 1) → Move forward → Attempt to stop. Because she pressed the accelerator when reversing, we can assume that she continued pressing the accelerator when attempting to move the vehicle forward. It can also be assumed that she continued pressing the accelerator right before unsuccessfully attempting to move her foot from the accelerator to the brake to stop the vehicle after having moved forward.
- One possible reason for the pedal misapplication was the fact that the driver had only owned the vehicle for two months at the time of the accident. This means she may not have been physically familiar with the pedal positions of this “unfamiliar vehicle”. Furthermore, from testimony provided by Driver A, it seemed that her attention was distracted by her acquaintance and that she became panicked after the minor collision with the utility pole.
- In addition to this case study, there was also a case study in which a driver attempting to straighten their vehicle in a parking garage using a process of Reverse → Move forward → Attempt to stop accidentally pressed the accelerator when attempting to press the brake. Among the numerous similarities shared by that case study with Case Study 1 is the fact the vehicle in that case was an “unfamiliar vehicle” that had only been owned by the driver for one month.
- The following are possible measures for preventing pedal misapplication in such circumstances:
  - When reversing and moving forward at low speeds, drivers should lightly place their foot on the brake and proceed using idle creep\*.
  - This reduces the need for pedal switching.
  - When a driver is still unfamiliar with a vehicle, they should press both the accelerator and brake before driving to confirm the positions of both pedals.
  - Because the low speeds of parking lots and parking garages often cause drivers to be careless despite the various dangers present, drivers should focus on driving and ignore distractions when driving in such locations. By practicing safe driving techniques such as these, drivers should be able to avoid a chain of events in which pedal misapplication occurs due to drivers panicking when a minor collision occurs.

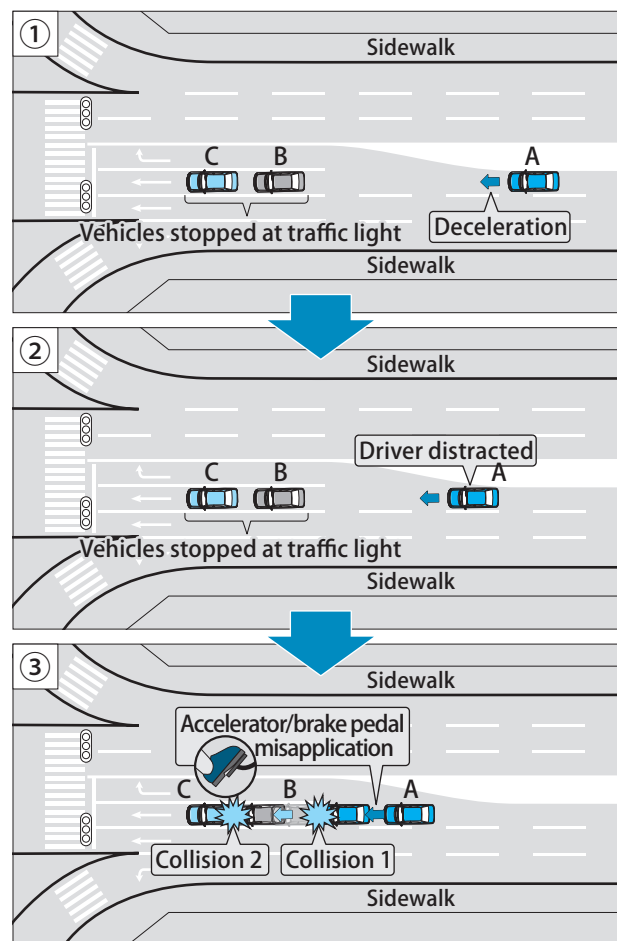
\* “Idle creep” refers to when the vehicle moves slowly without the accelerator being pressed when the shift lever is shifted to a position (other than P [Park] or N [Neutral]) in vehicles with an automatic transmission. Note that some vehicles with automatic transmissions do not exhibit idle creep.

## ◆ Accident case study 2 “When approaching stopped vehicles at a signalized intersection from behind (Fig. 3)”

Driver: Driver A (male, late 60s, medium-sized passenger car with automatic transmission)

[Accident occurrence process]

- ① While driving in the rightmost lane of a straight road with three lanes on each side, Driver A noticed the vehicles of Drivers B and C stopped ahead at the signal and proceeded towards them by decelerating to approximately 40 km/h.
- ② While decelerating, the signal changed to green and Driver A diverted his line of sight to a building on the right side of his course of travel for no particular reason.
- ③ When Driver A reverted his line of sight back to his direction of travel, he noticed that the vehicles of Drivers B and C still stopped ahead, but he was already too close. Driver A then attempted to stop by pressing the brake, but instead accidentally pressed the accelerator and ended up colliding with the vehicle of Driver B while accelerating. The vehicle of Driver B was pushed forwards and collided with the vehicle of Driver C. Driver C in turn suffered minor injuries.



**Fig. 3 - When approaching stopped vehicles at a signalized intersection from behind**

[Observations]

- The process in which pedal misapplication occurred was: Decelerate → (Become distracted) → Attempt to accelerate. According to the testimony of Driver A, he had assumed that since the signal had turned green, the vehicles stopped ahead would have started moving. As a result, he took his foot off the brake after decelerating and it is possible that the direction and position of his foot were those in which he was conscious of the accelerator. However, when he realized he had to stop and attempted to brake again, he may have accidentally pressed the accelerator.
- One possible reason for the pedal misapplication was the fact that the driver had switched from a vehicle with a manual transmission to one with an automatic transmission only 10 days prior to the accident. This means he may not have been physically familiar with the pedal positions of this “unfamiliar vehicle”. It can also be assumed that Driver A panicked due to the dangerous conditions created by the “assumption” mentioned in his testimony and the fact that he was already too close to the vehicle ahead.
- In addition to this case study, there was also a case study in which a driver stopped in traffic at a signal “assumed” that the vehicle in directly in front of them would begin moving since other vehicles located further up had begun moving and started up their vehicle without looking ahead. This driver panicked once they realized that the vehicle directly in front of them was still stopped and accidentally pressed the accelerator. That case study also shares numerous other similarities with Case Study 2.
- The following are possible measures for preventing pedal misapplication in such circumstances:
  - After decelerating, drivers should proceed with their foot on the brake and utilize inertia while adjusting the speed with the brake.
  - As with Case Study 1, drivers should confirm the positions of both pedals before driving.
  - Because drivers often become careless when decelerating before an intersection and due to the dangers present when traffic signals at intersections change, drivers must always keep their eyes on the road in front of them without making assumptions or becoming distracted. By practicing safe driving techniques such as these, drivers should be able to avoid a chain of events in which pedal misapplication occurs due to drivers panicking when a dangerous situation arises.

### ◆Accident case study 3 “When attempting to enter the roadway from a roadside business (Fig. 4)”

Driver: Driver A (male, late 60s, medium-sized passenger car with automatic transmission)

[Accident occurrence process]

- ① Driver A moved his vehicle towards the exit of a parking lot of a roadside business so that he could turn left and enter the roadway.
- ② Driver A pressed the brake so he could stop his vehicle in front of the sidewalk and confirm that it was safe to proceed.
- ③ When doing so, the foot of Driver A slipped, causing him to press the accelerator. This caused the vehicle to accelerate suddenly and proceed into the roadway, where it collided with the vehicle of Driver B who was proceeding from the right.
- ④ After colliding with the vehicle of Driver B, the vehicle of Driver A crossed the oncoming lane and collided with a wall before coming to a stop. The vehicle of Driver B then proceeded to collide with the vehicle of Driver C, after which it rolled over and came to a stop. Both Driver B and Driver C suffered minor injuries.

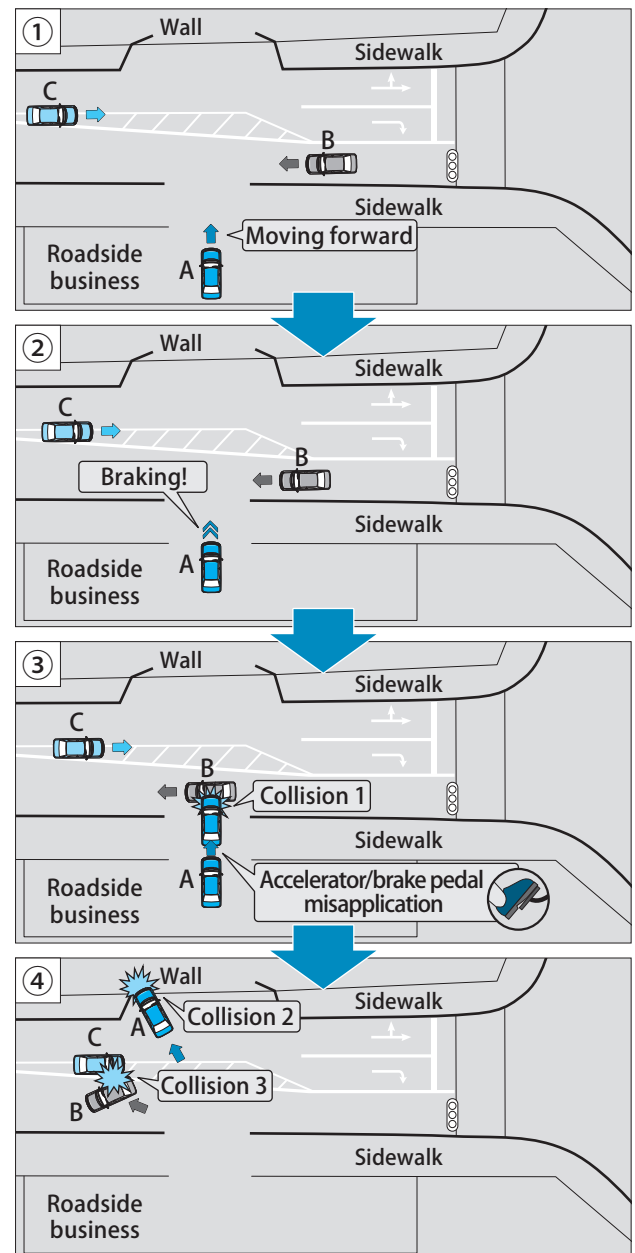


Fig. 4 - When attempting to enter the roadway from a roadside business

[Observations]

- The process in which pedal misapplication occurred was: Move forward → Stop → Attempt to start up. During this process, Driver A switched his foot from the accelerator to the brake when attempting to stop after moving forward. However, his foot slipped after pressing the brake, causing him to accidentally press the accelerator.
- Possible reasons for the pedal misapplication include the fact that the driver was wearing sandals and the fact that the bottom of those sandals became wet when the driver stepped in a puddle in the parking lot of the roadside business, causing them to be slippery.
- In addition to this case study, there was also a case study in which a driver attempting to proceed into the roadway by turning left from a roadside business started up their vehicle but failed to notice the presence of a pedestrian crossing directly in front of the vehicle because they were only paying attention to the roadway to the left, causing them to collide with the pedestrian and misapply the pedal due to panicking.
- Various dangers are present when entering the roadway from a roadside business. To prevent pedal misapplication in such circumstances, not only must drivers wear appropriate footwear, but they must also never forget to check the surrounding area for obstacles such as pedestrians or other vehicles to the front, rear, left and right.

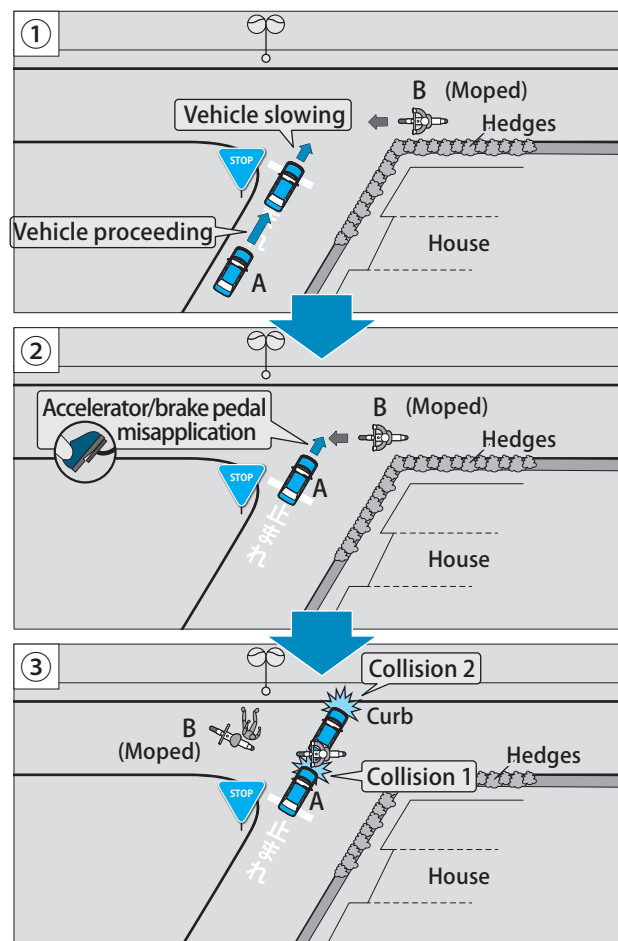


### ◆ Accident case study 4 “When attempting to enter a non-signalized intersection (Fig. 5)”

Driver: Driver A (female, early 50s, kei-sized passenger car with automatic transmission)

[Accident occurrence process]

- ① Driver A was driving on a two-lane road towards a three-way intersection that requires vehicles to come to make a full stop. In their approach to the intersection, Driver A decelerated in preparation for a right turn. However, poor visibility to the right caused by a house and hedges prevented Driver A from confirming whether any vehicles were approaching. Driver A then slowed her vehicle without stopping at the stop line, bringing her vehicle even closer to the intersection.
- ② Right before proceeding into the intersection, Driver A recognized that Driver B (moped) was proceeding along the road from the right side of the intersection. Driver A then attempted to press the brake, but accidentally pressed the accelerator and proceeded to enter the intersection while accelerating.
- ③ The vehicle of Driver A then collided with Driver B, after which the vehicle of Driver A proceeded to collide with the curb located ahead, where the vehicle came to a stop. Driver B in turn suffered minor injuries.



**Fig. 5 - When attempting to enter a non-signalized intersection**

[Observations]

- The process in which pedal misapplication occurred was: Slow down → Attempt to turn right. After slowing her vehicle, Driver A took her foot off the brake so she could turn right and it is possible that the direction and position of her foot were those in which she was conscious of the accelerator. However, when she realized she had to stop and attempted to brake again, she may have accidentally pressed the accelerator.
- One possible reason for the pedal misapplication was the fact that vehicle being driven by Driver A was an “unfamiliar” loaner vehicle that she had only driven for 3 days. This means she may not have been physically familiar with the pedal positions. Other possible reasons include the poor visibility, the fact that the driver was unfamiliar with the road and had only driven down it 3 or 4 times in the past, as well as the fact that the driver did not come to a full stop at the stop line. As a result, it is possible that Driver A panicked upon realizing the dangerous situation she was in once she spotted the other vehicle immediately before it entered the intersection.
- In addition to this case study, there was also a case study in which a driver attempting to proceed straight through a four-way intersection with poor visibility to both the left and right came to a full stop before starting up. However, when doing so, they noticed a bicycle coming from the right and attempted to apply the brakes suddenly, but instead accidentally pressed the accelerator with great force.
- Possible methods of preventing pedal misapplication in such circumstances would be to use idle creep when slowing down as shown in Case Study 1, or to confirm the positions of both pedals before driving. Also, although it is necessary to come to a full stop at the stop line, there may be times when this not enough to confirm whether other vehicles are approaching. In such cases, it is necessary for drivers to start up and stop again one or two times following a full stop so that they can proceed gradually through the intersection in an effort to spot any vehicles that may be approaching the intersection in advance.

### ◆ Accident case study 5 “When proceeding through a curve (Fig. 6)”

Driver: Driver A (female, late 30s, kei-sized passenger car with automatic transmission)

[Accident occurrence process]

- ① Driver A was proceeding along a two-lane road lined with houses on both sides without paying attention to the road.
- ② While driving along a right curve, Driver A failed to steer the vehicle in line with the road and instead proceeded straight ahead, causing her to ride up on the sidewalk and curb on the left side of the road.
- ③ The impact from riding up on the curb caused Driver A to come to their senses, at which moment she turned the steering wheel to the right while attempting to press the brake suddenly.
- ④ While pressing the brake, the foot of Driver A accidentally slid over to the accelerator pedal, causing the vehicle to accelerate suddenly and collide with a tree. The passenger in the vehicle of Driver A died as a result.

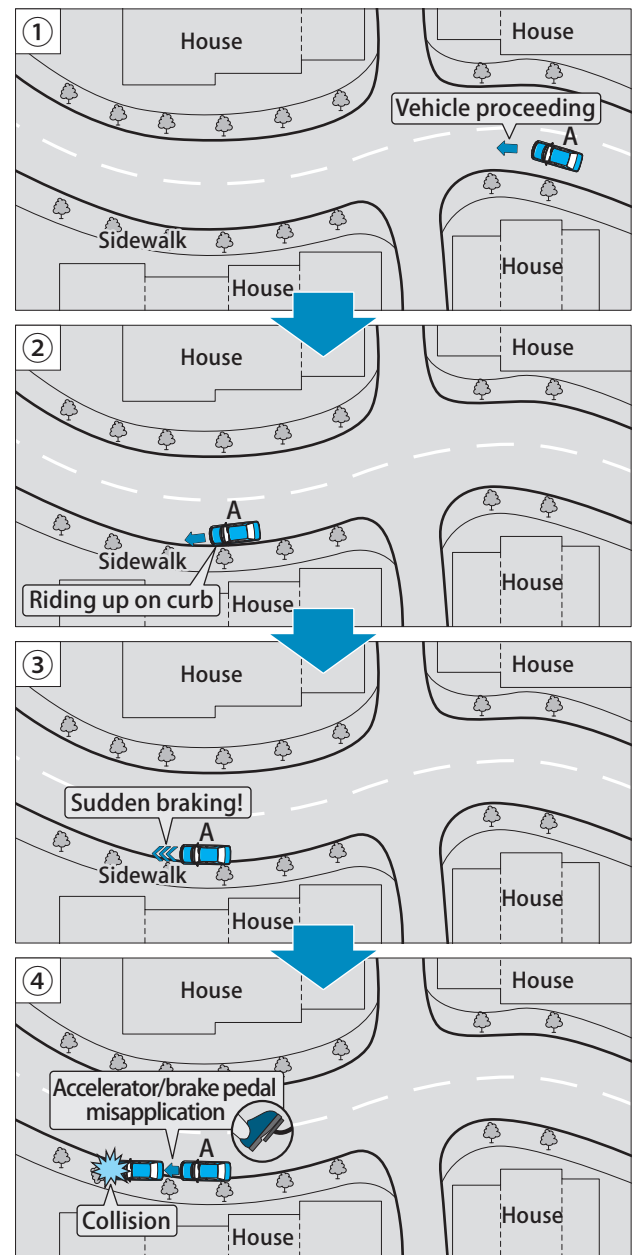


Fig. 6 - When proceeding through a curve

[Observations]

- It seems that riding up on the curb while proceeding along the curve caused Driver A to panic and turn the steering wheel suddenly, resulting in her foot slipping from the brake and over to the accelerator.
- One possible reason for the pedal misapplication was the fact that Driver A was not paying attention to the road in front of her, which resulted in her riding up on the curb. It is possible this dangerous situation caused her to panic, while the impact from riding up on the curb and the sudden turning of the steering wheel possibly caused her posture to shift.
- To prevent pedal misapplication in such circumstances, drivers must always pay attention to the road in front of them. By practicing safe driving techniques such as this, drivers should be able to avoid a chain of events in which pedal misapplication occurs due to driver panic and posture shifting when they face a dangerous situation such as riding up on a curb.

## 4 Conclusion

We were able to learn various things from these detailed case studies on accelerator and brake pedal misapplication accidents.

For example, pedal misapplication can occur easily when drivers frequently move their foot from one pedal to the next, such as when changing directions in a parking lot or when coming up behind other vehicles stopped at a signalized intersection. Such pedal misapplication accidents can also occur in situations where it is necessary to pay attention for various obstacles such as other vehicles or pedestrians when exiting a roadside business or when entering the roadway at a non-signalized intersection. Furthermore, pedal misapplication can also occur in unfamiliar vehicles or when drivers are wearing inappropriate footwear.

We believe the following are examples of effective methods for minimizing the risk of pedal misapplication to the greatest degree possible.

- Because of the various dangers present in parking lots, drivers should lightly place their foot on the brake and proceed using idle creep when moving forward or reversing, all while watching their surroundings for obstacles such as pedestrians or bicycles.
- In proceeding towards a signalized intersection when the signal changes, drivers should proceed with their foot on the brake and utilize inertia while adjusting the speed with the brake.
- When a driver is still unfamiliar with a vehicle such as new vehicle, they should press both the accelerator and brake before driving to confirm the positions of both pedals.
- Drivers should avoid footwear such as sandals that make pressing of the accelerator and pedal difficult and should always check their shoes to see if they are wet and slippery, etc.
- To prevent panicking in the event of a minor collision or the occurrence of dangerous situation, drivers should always practice safe driving procedures such as predicting possible dangers while avoiding assumptions, as well as paying attention to the road in front of them and remembering to come to a full stop at stop signs.

Although the prevalence of technologies that assist drivers in avoiding pedal misapplication is increasing, there is no way to prevent all accidents caused by pedal misapplication. We hope that readers can utilize what they have learned from these case studies to achieve reductions in accelerator and brake pedal misapplication accidents, even if only slightly.

(Masanori Taniguchi)

### 参考文献

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