

# Case Examples of Visually Impaired People Falling Off from a Platform of Train Stations

University of Tsukuba MIZUNO Tomomi  
University of Tsukuba TOKUDA Katsumi

## I . Introduction

One of the places where visually impaired people feel in danger while traveling is a platform of a train station (Tokuda, Arai, Matsumura, Nagaoka & Mochizuki, 1999). Accidents, some of which are fatal, involving visually impaired people falling off the platform are never ending. According to a survey conducted by the Ministry of Land, Infrastructure, Transport and Tourism (2020), there were 61 cases of falling incidents involving the visually impaired, and in 5 cases, the victim encountered a train or other object.

There is no doubt that platform doors and movable platform fences (together, “platform doors”) can be effective for prevention of falling. The Basic Guidelines for Promoting Easily Accessible Public Transportation and Facilities (2011) was adopted to promote quick installation of platform doors at train stations with 100,000 or more users per day.

Nonetheless, it could take a long time for these facilities to be fully installed with platform doors due to various challenges, including the need of considerable number of financial resources, and having to arrange the platform doors and the train carriage doors to be aligned in position. In the meantime, the visually impaired people use the train

stations daily. Therefore, it is an urgent necessity to come up with some measures to reduce the falling risks for the visually impaired even without platform doors, instead of just waiting for the much-needed platform doors to be installed.

In this study, the survey subjects with visual impairment, who use train stations independently on regular basis, are asked some questions regarding whether they have had any experience of falling off from a platform, and if they have, in what situation they fell or almost fell (near-miss incident). Based on the findings, the potential problems that may be present on platforms are reviewed and presented as a material, which hopefully would contribute to make a proposal for how platform safety can be improved while waiting for the installation of the platform doors.

## II . Method

### 1. Survey Subjects

A total of 34 survey subjects who use train stations regularly, including 15 completely blind people (including a guide dog user) and 19 partially sighted people. They are members of Japan Federation of the Visually Impaired Sport Council or are recruited by a researcher specializing in visual impairment.

## 2. Survey Method

The hearing survey was conducted either in person or by the phone. The survey time was 40 minutes per person.

In the survey, the subjects were asked; whether they had ever experienced falling off from a platform, and if they had, any specific situations; whether they had ever experienced almost falling off from the platform, and if they had, any specific situations; as well as any trouble they experience when using a train station platform and any improvements they may wish to be made. The incidents of “falling-off from a platform” include falling in a clearance between a train and a platform.

## 3. Ethical Considerations

All attributes such as name, gender, age, etc. were quantified to ensure anonymity. This survey was conducted after obtaining the approval of the Ethics Committee of the University of Tsukuba Faculty of Medicine (Approval number: 1559).

## III. Result

Among the survey subjects, 76% (26 subjects) answered that they had had some experience of falling off from a platform while 91% (31 subjects) answered that they had had some experience of almost falling off from a platform.

The survey subjects were asked about specific situations they were in when they fell or almost fell off the platform. Some possible causes directly contributing to the fall are listed in Table 1. As shown in Table, the most common answer was “Insufficient safety check” (68%). Some factors behind “Insufficient safety check” included “As I heard a departure bell, I acted hastily

assuming the train I was going to get on had already arrived at the platform”, “I hurried myself because I didn’t want to be in the way of anyone around me”, and “I took it for granted and dropped my guard as I was so used to using that train station”. It should be noted that among those who answered, “I hurried myself because I didn’t want to be in the way of anyone around me”, some also mentioned that they felt they should first check the floor of a train car using a white cane, but hesitated to do so, thinking his/her taking the time to do so might cause inconvenience to other passengers during morning and evening rush hours.

Among the “insufficient safety check”, the most common situation was that the survey subjects “mistook the vehicle connecting part for train doors” (32%). The issues especially pointed out were that let alone an absence of guard screen (a cover supposedly installed outside the vehicle connecting parts), even the installed guard screens are not detectable with a white cane because of their inappropriate position. This makes it hard to identify whether it is a vehicle connecting part or open door. Moreover, for a question about more specific situations experienced by those who answered, “I missed the warning blocks and went all the way to the platform edge”, the description was that “Although I noticed that there were warning blocks, I mistook them for the warning blocks in front of the stairs because tactile directional bars were not attached to the warning blocks. Thus, I stepped forward”. As demonstrated here, there are cases where falling-off from a platform is caused by the inconsistency in the installation policy of directional bars.

Table 1. Situations where a visually impaired survey subject was in when he/she fell off or almost fell off from a platform (multiple count) N=34

	n	%
Insufficient safety check	23	68%
Mistook the vehicle connecting part for train door.	11	32%
I missed the warning blocks and went all the way to the platform edge.	8	24%
Mistook the clearance between the falling prevention fence and the front carriage of the train for train door.	5	15%
(On an island platform) Assumed the train arriving on the opposite side of the platform as his own train.	4	12%
Unexpectedly, a carriage was not there in front of me because, retrospectively, the stopping position of a front carriage varies depending on the length of the train.	4	12%
Accidentally I stepped in the clearance between the platform and the train that was wider than expected.	4	12%
I lost a sense of direction when trying to avoid passersby and objects (such as posts and trash cans.	12	35%
The way of escorting was not appropriate.	11	32%

Furthermore, one of the survey subjects who answered, “Unexpectedly, a carriage was not there in front of me because, retrospectively, the stopping position of a front carriage varies depending on the length of the train”, fell off the platform where guide blocks installed in the direction of short side (in the direction toward the train tracks) were directed to the empty space away from the front carriage. The person who gave this answer was apparently traveling on a train at an unusual time of the day. Usually, this person walks with the help of tactile paving to get on a train from the door that opens right at the guide blocks. On the day of falling off the platform, the only thing this person attempted to do was to get on a train in the

same way as usual. It is already hard for a visually impaired person to identify the right spot to get on a train, considering the different number of train carriages arriving at a platform each time. If there is also inconsistency in availability and dependability of the guide blocks that the visually impaired people use as a guide to get on a train, that would only accelerate their confusion.

As for a person who “mistook the clearance between the fall prevention fence and the front carriage for open door” (15%) on a platform where fall prevention fences were installed, this person became panicked while trying to get on a train already arrived at the platform and mistook the clearance between

the falling prevention fence and the front carriage of the train for a door of the front carriage (Photo 1).

Thirty-five percent (or 12) of the survey subjects “lost a sense of direction when trying to avoid passersby and objects”. Half of them (6 subjects) said that they usually walk on or beside the warning blocks installed at the platform edge when walking on the platform, but if there are posts or people standing on the blocks, they try to circumvent. That was when each of them actually falls or almost fell. Let alone the completely visually impaired, the partially sighted persons are uncertain about whether it is possible for them to detour toward the center of the platform to avoid a post standing on the blocks. If they detour toward the track side, then they would end up exposing themselves to a risk of falling or coming into contact with a train.

All four survey subjects who answered, “The way of escorting was not appropriate” said that they fell in the clearance between

the train and the platform. Two of them fell while being escorted by an employee of the railroad company. A possible situation behind this is an escort’s lack of knowledge, skills and communication that are crucial when helping a visually impaired person to get on a train. Typically, an escort goes ahead and get on a train first, followed by a visually impaired person, who checks the clearance between the train and the platform, as well as the height of the carriage floor before getting on the train. But in the aforementioned cases, an escort did not give enough time for the visually impaired person to check or did not communicate well to describe the circumstance. The employees of railroad companies are especially required to receive training to thoroughly learn how to provide escorting services.

To a question about their requests, other than a request to install fences, to improve the train station platform, 18 survey subjects responded. As shown in Table 2, the most



Photo 1. The clearance between the falling prevention fence and the front carriage of the train (Osaka-Abenobashi, Kintetsu Railway)

Table 2. Request from the visually impaired persons for improvement of platforms (multiple count)

	N=18	
	n	%
Tactile paving should be installed so that the visually impaired persons may walk on the platform safely.	13	72%
Vending machines and trash cans should not be placed in the middle of a platform.	8	44%
There should be some clue to locate a door of the train.	5	28%
The tactile paving installation policy should be kept consistent in all train stations.	3	17%

common requests included, “Tactile paving should be installed in a way that the visually impaired persons may walk on the platform safely” (72%) and “Vending machines and trash cans should not be placed in the middle of a platform” (44%). Both opinions derived from their frustration for the presence of so many people and objects on a platform, making it difficult for them to walk with a peace of mind. When they circumvent people or objects to avoid collision, the orientation of the body is shifted, and a sense of direction gets lost. As a consequence, they are unable of arriving at a destination (such as the stairs), ending up getting disoriented. The visually impaired people are prone to accidents or injuries not only on a platform, but whenever they get disoriented, i.e., losing track of where they are or losing a sense of direction (Tokuda, Mizuno, Nishidate & Arai, 2008). The tactile paving on a platform has mostly limited installation only for a short distance between elevator/stairs to the platform edge. Even if a visually impaired person is able to arrive at the edge of the platform and get on a train from the nearest door using the tactile paving, it is often not easy for him/her to find tactile paving at the station of destination. In other

words, the tactile paving currently installed on platforms are not serving as an appropriate facility helping the visually impaired to walk with a peace of mind.

For a question about how to walk in the direction of long side of the platform without platform doors, the answers included that “I walk inside the warning blocks (inner platform) while checking the tactile directional bars attached to the warning blocks with my white cane or touch to a foot sole”, and as shown in Photo 2, “I walk while feeling the edge of the platform with the tip of the white cane and checking the warning block with touch to a foot sole”. The survey subject who walks while feeling the edge of the platform with the tip of the white cane, added, “Although I don’t think this is the best way because there is a risk associated with an approaching train, I have no other choice”. As a reason for continuing to do so despite a potential risk, this person pointed out that even though he wants to walk inside the warning blocks (closer to the center of the platform) with the tactile directional bar as a guide, it is difficult to do that because of the people lining up, waiting for a train on the platform and some luggage placed in the way.



Photo 2. A visually impaired person walking while feeling the edge of the platform

In addition, there was an opinion that said, “Previously, the benches were placed in parallel to the tracks, therefore, I was able to correct myself as to traveling direction by checking which way a bench was facing. Recently, however, there is an increasing number of train stations having the benches placed vertically to the edge of the platform. This is not only making it more difficult to check the direction, but also making it easier to collide with the benches”. Ironically, the measures taken, centering around the Kansai area, to prevent drunk passengers from falling, which is to shift the position of the benches on the platform to be vertical to the edge of the platform, made it harder for the visually impaired to walk as the benches now occupy wider area in the middle of the platform, and deprive them of a clue to recognize which way the edge of the platform is.

Furthermore, there was another opinion that said, “I lose a sense of direction when circumventing cylindrical post”. When a visually impaired person detects obstacles, such as posts, with the white cane, the person uses the hand other than the one holding the

cane to check the obstacle and take a roundabout path to proceed. If it were prismatic column, he can feel each side of the column and recover the original direction of travel. However, in case of cylindrical column, the person would lose a clue to know how far he should go around and ultimately lose a sense of direction.

Some other opinions included “there should be some clue to locate a door of the train”, and “there should be consistency in tactile paving installation on every train station platform”. They say they become unable to identify the location of the doors and the stairs even with the use of tactile paving as a guide, and their panicked state of mind could cause them to fall or have a near-miss incident. The same person said he often gets confused by the significant differences in tactile paving installation policies at different train stations.

It is fair to say from the above findings that installation of tactile paving and keeping the tactile paving installation policy consistent in all train stations are crucial for the visually impaired persons to walk safely on the platform.

#### IV. Conclusion

As a result of the study, it is found that 76% of the visually impaired survey subjects have experienced falling off from the platform while 91% have experienced an almost falling incident, forcing most of them to use the train stations, exposing themselves to a risk of falling off the platform. Although the most common direct cause of falling, according to their self-analysis, is “insufficient safety check”, there are defects and inconsistencies in barrier-free facilities, contributing to the problem. More specifically, there is an absence of guard screens at the cart junction, or some guard screens have unrecognizable configurations for the visually impaired. Another problem is that while some stations have tactile directional bars included in the warning block at the edge of the platform, others don't. Moreover, there are no fall prevention fences or some fences have opening that could be mistaken for carriage doors. The problems associated with aforementioned issues, including the defect and inconsistency in the barrier-free facilities, should be broadly communicated to those involved in the railroad business for improvement so that the visually impaired persons are able to travel on a train without feeling confusion.

Having said that, some cases might have been avoided if anyone around should say something or give a hand. In these cases, a visually impaired person mistook the cart junction or the clearance between the fall prevention fence and the front carriage of the train for train door. In a situation where a total blind person stepped in the clearance between the platform and a train, he was in haste trying to avoid getting in the way of

other passengers. In a similar incident, a visually impaired person could not check the floor of a carriage with the white cane because the escort did not have the appropriate escorting skills. In order for a visually impaired person to ride a train safely, the person needs to check the floor of a carriage using the white cane, first. It is important that the bystanders understand that this may take a certain amount of time and allow the person to do that; create an environment where the person can get on a train without being rushed; and give a hand to help as necessary. One could argue that there must be many accidents that are avoidable with bystanders who are more knowledgeable about safe train travel for the visually impaired people; who are willing to say something; and who have learned how to escort a visually impaired person appropriately. In other words, it is considered that a number of accidents involving the visually impaired persons falling off from a platform would significantly decrease by thoroughly exercising “humane barrier-free” in addition to promoting “physical barrier-free” in the railroad industry.

In the future, the study team will verify the actual platform situations based on these findings and sort out what kind of problems there are.

#### References

- Ministry of Land, Infrastructure, Transport and Tourism (2020) Situation Concerning Falls from Station Platforms, <<https://www.mlit.go.jp/tetudo/content/001378759.pdf>>, (June, 25, 2022).
- TOKUDA K., ARAI K., MATSUMUR M., NAGAOKA H. & MOCHIZUKI T. (1999)

Research on Traffic Safety Needs of the Persons with Visually Impaired as Pedestrians, International Association of Traffic and Safety Sciences, Tokyo, (in Japanese).

and Improving the Tactile Ground Surface Indicator (TGSI), *IATSS Review*, 33(1), 98-107, (in Japanese).

TOKUDA K., MIZUNO T., NISHIDATE A. & ARAI K. (2008) Standardization and Classification, Substandard Installation

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## Case Examples of Visually Impaired People Falling Off from a Platform of Train Stations

MIZUNO Tomomi and TOKUDA Katsumi

The purpose of this study was to clarify what situation visual impaired people fell or almost fell (near-miss incident). The survey subjects were 15 completely blind people (including a guide dog user) and 19 partially sighted people who use train stations regularly. They were individually interviewed whether they had ever experienced falling off from a platform, and if they had, any specific situations; whether they had ever experienced almost falling off from the platform, and if they had, any specific situations; as well as any trouble they experience when using a train station platform and any improvements they may wish to be made.

As a result of the study, it is found that 76% of the visually impaired survey subjects have experienced falling off from the platform while 91% have experienced an almost falling incident. Although the most common direct cause of falling, according to their self-analysis, is “insufficient safety check”, there are defects and inconsistencies in barrier-free facilities, contributing to the problem. More specifically, there is an absence of guard screens at the cart junction, or some guard screens have unrecognizable configurations for the visually impaired. Another problem is that while some stations have tactile directional bars included in the warning block at the edge of the platform, others don't. Moreover, there are no fall prevention fences or some fences have opening that could be mistaken for carriage doors.