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## Recreational Spaces for the Visually-Handicapped Part 2: Evaluation of Shops on a Guided Bus Tour

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### Abstract

It is important to create and modify the environments in which the visually-handicapped can go shopping easily and enjoyably. This study is based on “taking part in a guided bus tour”<sup>1)</sup>, and we investigate whether they can indeed enjoy shopping in the facilities visited. The guided bus tour takes one whole day, during which they visit five facilities - an aquarium, a multi-purpose dome, a castle, a water bus and a sky observation deck. All these facilities have some shops, except for the water bus.

### 1. Introduction

We all enjoy shopping, as it is one of the most pleasant of recreations. It is also a pleasure for visually-handicapped people. However, most visually-handicapped people only leave their home if they absolutely must, because there are still many dangerous spaces for them and they often have accidents or lose their way. It is important to create and modify environments in which the visually-handicapped go shopping to make them easy and enjoyable for them. In this way, we can begin to enrich their quality of life.

Our team has carried out a series of studies<sup>2-4)</sup> on recreational spaces for the visually-handicapped and the spatial cognition of them. Spatial research on the visually-handicapped has been published since the 1980's, and there are already a large number of findings. Prior investigations have focused upon areas such as those for outdoor recreation and sports<sup>5)</sup>, cultural and commercial facilities<sup>6)</sup>, as well as on wayfinding<sup>7)</sup>, spatial cognition<sup>8)</sup>, and so on. However, there have been few studies on enjoyable shopping for the visually-handicapped.

This study is based on “Recreational Spaces for the Visually-Handicapped: Taking Part in a Guided Bus Tour”<sup>1)</sup>, part 1, in which we investigated whether they can enjoy shopping in the facilities visited. The guided bus tour takes one whole day, during which the subjects visit five facilities - an aquarium, a multi-purpose dome, a castle, a water bus and a sky observation deck. All these facilities have some shops, except for the water bus, and one main shop in each facility is investigated using questionnaires and interviews. The evaluation of data gathered is made by comparing the visually-handicapped to the normal-sighted.

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## 2. Outline of Experiments

### 2.1 Subjects

The subjects are five visually-handicapped people between 18 and 29 years old, and five normal-sighted university students aged between 20 and 25 years old.

Description of the visually-handicapped subjects is shown in Table 1.

Table 1. Description of the visually-handicapped subjects

Subjects	blind 1	blind 2	blind 3	blind 4	blind 5
age / sex	29years/male	22years/male	28years/male	22years/male	18years/male
occupation	self-employed business man	university student	unemployes	university student	university student
level of handicap	1st class, acquired blindness	1st class, acquired blindness	1st class, acquired blindness	1st class, acquired blindness	1st class, acquired blindness
age when became blind	17 years	0 years	0 years	20 years	15 years
disease	glaucoma, cataract	cataract	atrophy of optic nerve	diabetic	retinitis pigmentosa
eyesight 1 : right : left	light perception light perception	0 0	0 0	0 0	0 0
view	nothing	nothing	nothing	nothing	nothing
eyesight 2 : light : color : shape	△ × ×	× × ×	× × ×	○ × ×	○ × ×
hearing	normal	normal	normal	normal	normal
training : contents : age begun	walking training daily life training braille training personal computer 17 years	walking training daily life training braille training	walking training daily life training braille training	walking training daily life training braille training personal computer 20 years	walking training  braille training 11 years
braille reading	○	○	○	○	○
walking cane	all the time	all the time	all the time	all the time	all the time
education : primary : junior : high school : university : professional education	general course general course general course general course none	school for the blind school for the blind school for the blind general course none	school for the blind school for the blind school for the blind general course none	general course general course general course general course none	school for the blind school for the blind school for the blind general course none
destinations when going out	hospital, bank, customer	university, parents' home	Light-House, Osaka castle park	university, club activity	university
frequency	3 or 4 times/week	every day	once/week	5 days/week	5 days/week
care-giver accustomed place unaccustomed place	with a care-giver with a care-giver	alone alone	alone alone	alone with a care-giver	alone with a care-giver
transportation	train, bus, taxi	train	train, bus	train, bus, taxi	bus
housing type	detached house	apartment house	apartment house	apartment house	detached house
dwelling style	with family	without family	without family	without family	with family
health condition	good	good	good	good	good

### 2.2 Facilities and shops

The facilities visited are an aquarium named “Kaiyu-kan”, whose theme is the Pacific Ocean, a multi-purpose dome known as “Osaka Dome” with a capacity of 50,000 people, a heritage site, “Osaka Castle”, a water bus called “Aqua Liner”, and the observation deck of “the Umeda Sky Building”, which is 170m high. There are some shops in each facility, but Aqua Liner has no shops. All subjects visited the main shop at each site for 10-15 minutes when the tour there was over. An outline of the main shops at each facility is shown in Table 2.

The time required for this tour is eight hours. The sightseeing bus is a double-decker with a capacity of 64 people (See Fig. 1).

Table 2. Outline of facility shops


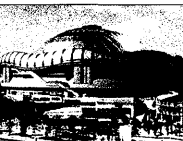
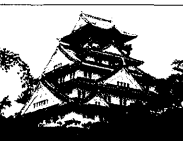





	Kaiyu-kan	Osaka Dome	Osaka Castle	Umeda Sky Building
exterior				
interior				
shop area (m <sup>2</sup> )	280	400	30	210
goods	jewelry miscellaneous glass goods toy animals tableware key rings stationery T-shirts cookies	T-shirts caps toy animals megaphones bat & ball snacks fans towels	key rings postcards pennants snacks cookies lanterns T-shirts pictures	key rings toy animals candy T-shirts cups towels wooden ornaments postcards
space composition & display	glass shelves wagon hanging wall display	wide area wide passage wooden shelves abundant goods showcases	small area glass counter showcases narrow passages	scattered stands pipe flame stands round glass shelves steel mesh shelves



Fig. 1 Tour bus (double-decker)

### 2.3 Experimental periods

The experimental periods were 23rd July and 23rd October, 2005. Although the two days are three months apart, it is thought that this would have had no influence on the evaluation.

### 2.4 Experimental and analysis methods

#### 2.4.1 Experimental methods

In this investigation, site shops were evaluated by questionnaire and interview. The questionnaire is mainly about “safety”, “enjoyment”, “comfort” and “satisfaction”. There are 9 questions about each shop. Answers are to be given by choosing one of five options.

Next, problems from the observers’ point of view were clarified and discussed.

#### 2.4.2 Analysis methods

Points are given each answer of the questionnaire, so that the results are easy to analyze. A good evaluation means high points. Score ranging from 1 to 5. 3 points are “regular”.

Next, significant differences in the evaluation between the visually-handicapped (v.h.) and the normal-sighted (n.s.) were analyzed by T-Test.

## 3. Results and Considerations

### 3.1 Evaluation of each shop

#### 3.1.1 Kaiyu-kan (aquarium): 10 minutes stay

Evaluation of the Kaiyu-kan shop is shown in Fig. 2. A significant difference between the v.h. and the n.s. is seen only in “stay duration”. In this category, the evaluation of the v.h. is

low, while that of the n.s. is high. The v.-h. tended to answer that stay duration was too short. In both the case of the v.-h. and the n.s., the evaluation of “losing the way” is remarkably low. Further, the evaluation of “relaxation” is low, and that of “safety” is not high. The shop of Kaiyu-kan was crowded with a lot of visitors, and the v.-h. had to take special care not to collide with others. The characteristics of this shop were abundant goods, a lot of glass goods, accessories on the glass shelves and a wall hanging display. Such goods were easy to break, and care was needed with navigating the shelves and displays. (Fig. 3)

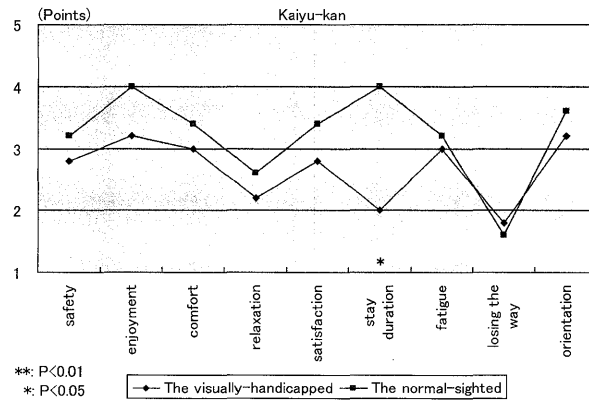


Fig. 2 Evaluation of the Kaiyu-kan shop

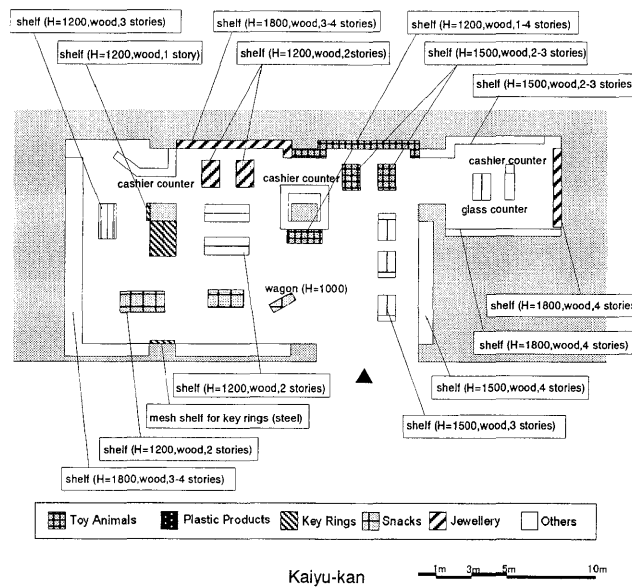


Fig. 3 Plan and photos of the Kaiyu-kan shop

### 3.1.2 Osaka Dome: 15 minutes stay

Evaluation of the Osaka Dome shop is shown in Fig. 4. A significant difference between the v.-h. and the n.-s. is seen only in “fatigue”. In this category, the evaluation of the v.-h. is extremely low, while that of the n.-s. is high. This shop was spacious and had abundant goods. There were a lot of cuddly animals and plastic goods, and most shelves were made of wood. Moreover, there were few visitors, since no event was taking place on the investigation day. All this made the v.-h. feel safe and relax. However, because the v.-h. walked around and they tried to see a lot of goods, they got tired. The v.-h.’s evaluation of “stay duration” and “losing the way” is high when compared with other facilities. The stay duration at Osaka Dome shop was longer than for any other shops, and it was easy for the v.-h. to recognize the space because the shop aisles were wide, the floor plan was narrow, and the exhibition was orderly (See Fig. 5).

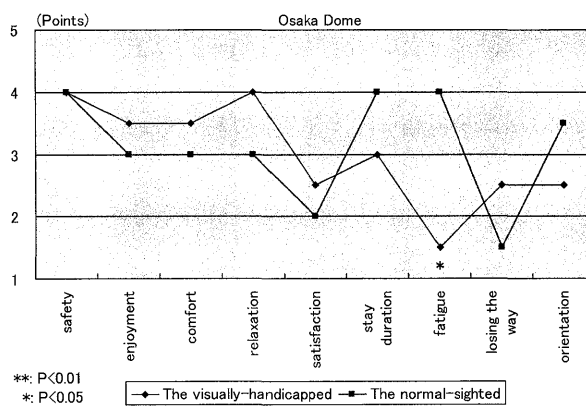


Fig. 4 Evaluation of the Osaka Dome shop

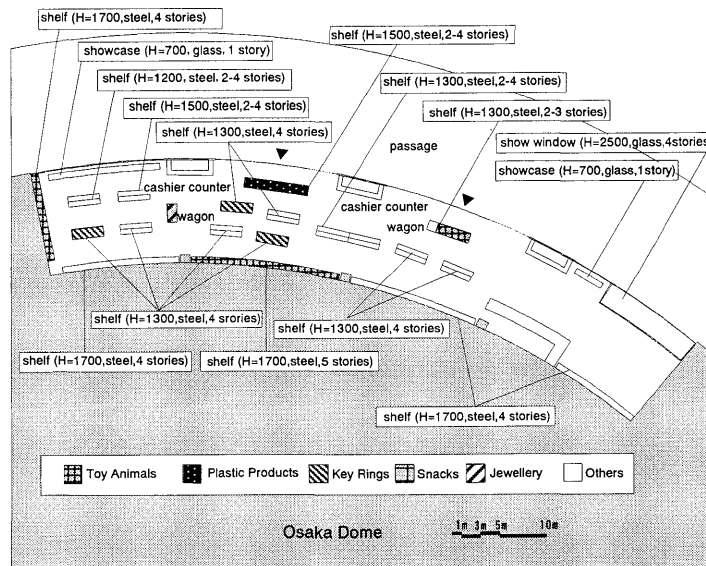


Fig. 5 Plan and photos of the Osaka Dome shop

### 3.1.3 Osaka Castle: 10 minutes stay

Evaluation of the Osaka Castle shop is shown in Fig. 6. A significant difference between the v.-h. and the n.-s. is seen in “stay duration” and “fatigue”. In these categories, the evaluation of the v.-h. is low, while that of the n.-s. is remarkably high. In both the v.-h. and the n.-s., the evaluation of “losing the way” is very low. This shop was of small area and crowded with a lot of visitors. The shop’s aisles were narrow. Therefore, the v.-h. easily lost their way and became tired. On the other hand, the v.-h.’s evaluation of “relaxation” is high. There were a lot of showcases along the walls, and a lot of cake boxes on the shelves. This made the v.-h. feel relaxed, because there was no worry that the showcase or the goods in the showcases might break, or that cake boxes made of paper would break. The v.-h. tended to answer that stay duration was too short. This shows that they need a long time for shopping in spite of a small shop area (See Fig. 7).

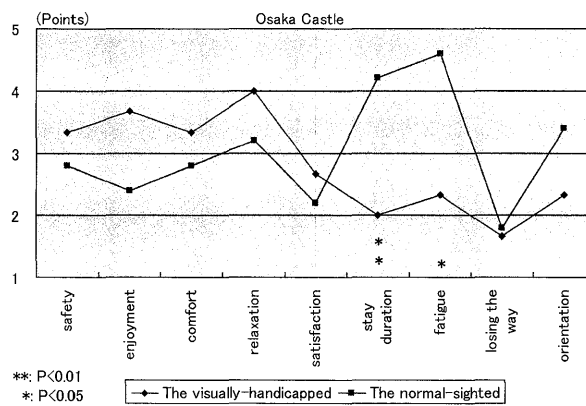


Fig. 6 Evaluation of the Osaka Castle shop

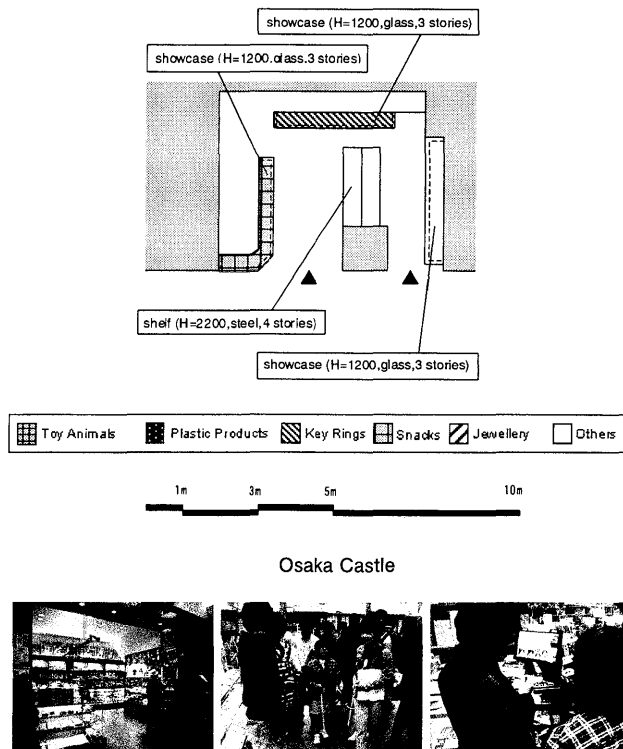


Fig. 7 Plan and photos of the Osaka Castle shop

### 3.1.4 Umeda Sky Building (observation deck): 10 minutes stay

Evaluation of the Umeda Sky Building shop is shown in Fig. 8. A significant difference between the v.h. and the n.s. is seen only in “stay duration”. In this category, the evaluation of the v.h. is lower than that of the n.s.. The v.h. tended to answer that stay duration was too short. With regard to “fatigue”, the difference between the two is large, but there is no asterisk. The characteristics of this shop were some scattered stands with steel pipe frame and round glass shelves. The v.h.’s evaluation of “losing the way” is extremely low. This shows that scattered stands prevented them from recognizing the space and walking through, in spite of few visitors. They bumped into them and could not walk straight. Further, it was difficult for the v.h. to recognize the spaces with round shelves. On the other hand, the n.s. could see through the spaces between the stands (See Fig. 9).

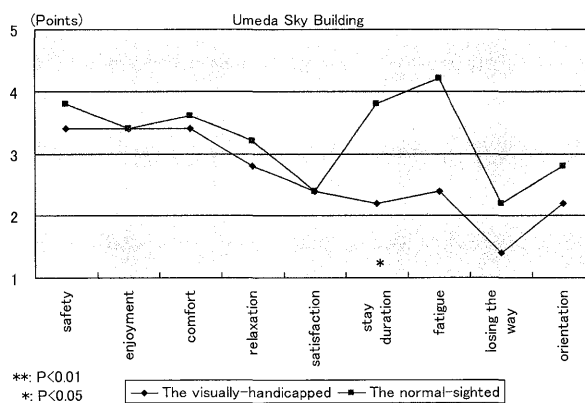


Fig. 8 Evaluation of the Umeda Sky Building shop

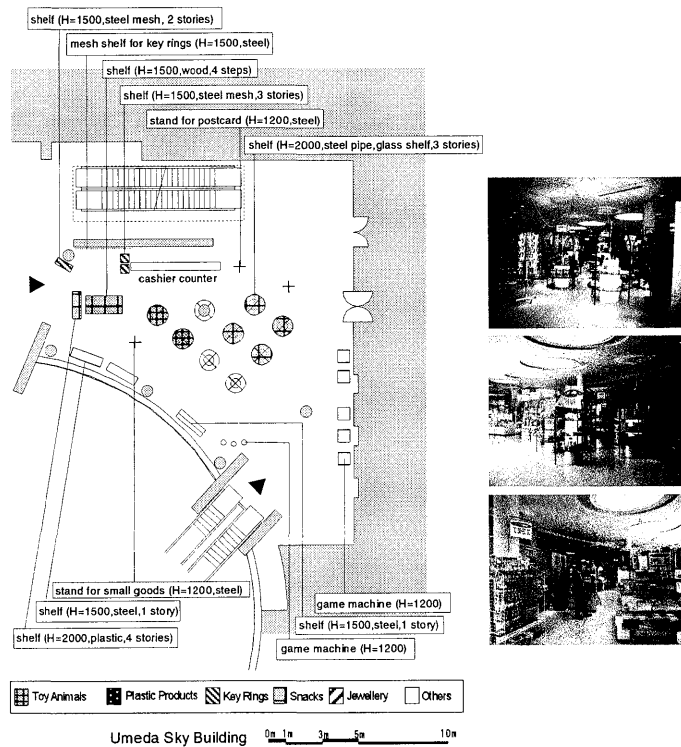


Fig. 9 Plan and photos of the Umeda Sky Building shop



### 3.2 Evaluation of all shops in total

The evaluation of all shops in total shows the average number of points for all shops in each category. The evaluation of all shops in total is shown in Fig. 10.

In most categories, the difference between the v.-h. and n.-s. is small, however in “stay duration”, “fatigue” and “orientation”, the difference is large. Especially, in “stay duration” and “fatigue”, there are asterisks and the evaluation of the v.-h. is lower than that of the n.-s.. This shows that the v.-h. needed a long time for shopping and they became tired while shopping. With both the v.-h. and n.-s., the evaluation of “losing the way” is the lowest. This shows that the n.-s. walked around and lost their way while shopping, and that the v.-h. could not recognize the spaces because the shops were crowded with visitors and they collided with them. Even if the shop was not crowded, they collided with scattered stands or shelves. Their evaluations of “safety” and “enjoyment” are quite high and those of “satisfaction”, rather low. This shows that they could feel safe and enjoy shopping, but they were not truly satisfied with the shops.

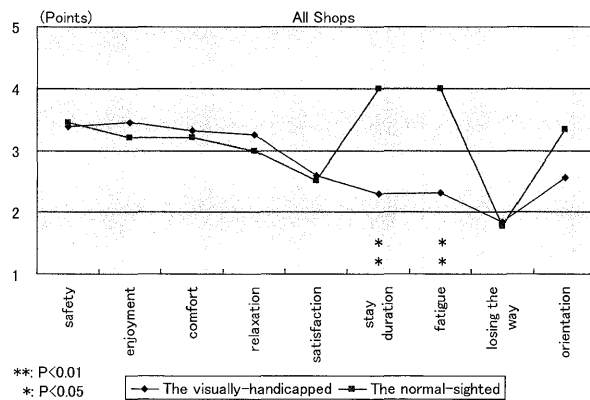


Fig. 10 Evaluation of all shops in total

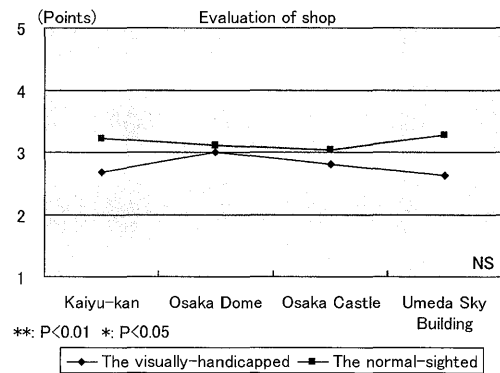


Fig. 11 Total evaluation of each shop

### 3.3 Total evaluation of each shop

The total evaluation of each shop shows average points for all categories in each shop. The total evaluation of each shop is shown in Fig. 11.

The n.-s. tended to evaluate higher than the v.-h. in all shops. But no significant difference between the v.-h. and the n.-s. is seen. In the case of the “Umeda Sky Building” shop, the evaluation of the v.-h. is lower than that of the n.-s.. The reason for this is that the v.-h.’s evaluation of “losing the way” is extremely low, and the n.-s.’s evaluation of “safety”, “enjoyment” and “comfort” is comparatively high (See Fig. 2). In the “Kaiyu-kan” shop, the difference between the two is also considerable. With the v.-h., the evaluation of the “Osaka Dome” shop is highest. The reason is that the v.-h. could feel safe and relax in it, and that the evaluation of “stay duration” and “losing the way” is comparatively high (See Fig. 4).

### 3.4 Problems observed (Fig. 12)

#### 3.4.1 Space composition

Three types of space composition could be seen. Type 1 is like the Umeda Sky Building shop. There were some stands scattered at the center of the shop. In this type, the v.-h.

tended to lose their way, since they collided with them and could not walk through. An example of Type 2 is the Osaka Castle shop, in which there were glass showcases along the wall. In this type, the v.-h. felt relaxed, because they could walk along the showcases in spite of a lot of visitors without colliding with them. However, it was difficult for them to touch the goods, and a v.-h. subject did bump into one projection from the wall. Type 3 includes the Kaiyu-kan and Osaka Dome shops. There were some wide commodity shelves at the center of the shop. However, the shelves of the Kaiyu-kan shop were much more numerous than those at Osaka Dome, and the width of the shop passage in the Kaiyu-kan was smaller than that in Osaka Dome. In the Osaka Dome shop, the entrance was wide and open, and the plan of the shop was long and slender. It was easy for the v.-h. to recognize the space. On the other hand, in the Kaiyu-kan shop, it was easy for the v.-h. to orientate themselves, since there were sections for different goods, and the goods were different on each shelf. Their position could be easily confirmed. But the Kaiyu-kan shop had one blind alley section, and the v.-h. tended to lose their way in it.

#### **3.4.2 Shop furniture and goods for sale**

The shop furniture was made of wood, glass, steel, and so on. The v.-h. took special care not to break the glass shelves and not to knock over the display stands, but they felt safe and relaxed with wooden shelves. Some v.-h. subjects collided with shelves or stands. The goods for sale were mainly jewellery, cuddly toy animals, key rings, T-shirts, and so on. The v.-h. always worried about breaking the glass jewellery and dropping the key rings, but they felt safe and relaxed with the cuddly animals, balls, T-shirts and plastic goods. Some goods were covered with vinyl. It is difficult for the v.-h. to distinguish these goods. Some v.-h. subjects hesitated to touch the goods, because they worried about damaging the goods. Some of them hesitated even to enter the shop. They always take special care with others, goods, furniture, and display of goods.

#### **3.4.3 Equipment and devices**

There were aids, such as tactile warning blocks, in most facilities. But, in the shops themselves, there was little of this. There were few tactile warning blocks on the shop floors. There was no braille on the shelf, nor on the price cards on the goods. It was not easy for the v.-h. to recognize the entrance or the cashiers, where the goods were and how much the goods cost. There were also no voice guides in the shops.

#### **3.4.4 Sales clerk assistance**

In the shop, the sales clerks did not help the v.-h.. The v.-h. did not understand where the sales clerks were. In Osaka Castle, one sales clerk was surprised at finding the v.-h.. The clerks have not received any training in how to help a handicapped person.

#### **3.4.5 Surrounding persons**

When the v.-h. were walking in the shop, people nearby did not try to help them. The v.-h. often bumped into surrounding people, and apologized. They always said "sorry" when walking in crowded shop. Since the v.-h. are keenly aware of troubling people nearby, they always have to take special care not to interfere with them. It is necessary here to remove not

only material barriers but also mental ones.



The v-h. enjoying the balls in the Osaka Dome shop



The v-h. enjoying touching the plastic megaphones in the Osaka Dome shop



The v-h. enjoying feeling the toy animals in the Umeda Sky Building shop



The v-h. touching key rings gingerly in Kaiyukan shop



The v-h. bumping into a projection from the wall in the Osaka Castle shop



The key rings covered with vinyl in the Umeda Sky Building shop

Fig. 12 The visually-handicapped shopping

#### 4. Conclusions

- (1) The difference between the v-h. and the n-s. is large in “stay duration” and “fatigue”. The v-h. take a long time for shopping and get tired. They always take special care not to trouble with others, damage the goods, break the shelves or disarrange displays.
- (2) With both the v-h. and the n-s., the evaluation of “safety” and “enjoyment” was quite high, and that of “satisfaction” was rather low, while that of “losing the way” was remarkably low in most shops.
- (3) The v-h. feel safe and relax, if the goods are toy animals or plastic goods, or if the shelves are made of wood. On the other hand, they feel nervous and strained when the goods are jewellery or glass goods, or if the shelves are made of glass. They handle the goods gingerly. Some v-h. subjects hesitated to touch the goods, and even to enter the shop. It is necessary here to remove not only material barriers but also mental ones.
- (4) The v-h. tend to lose their way, if they collide with others, a shelf or a projection from the wall. They often bumped into them in crowded shops. They also collided with scattered stands at the center of some shops. It is necessary to make a safe shopping route for such people. Moreover, round shelves don't help the v-h. to navigate. It is necessary to group different goods together and to make shelves providing spatial cognition and easier orientation.
- (5) There were few aids, such as tactile warning blocks, on the shop floors. There was no braille on the shelves, nor on the price cards on the goods. There were also no voice guides in the shops. It was difficult for the v-h. to understand the information provided

by the shops or the organization of their goods. It is necessary to set up some aids conveying such information, and it is important that the sales clerks are properly trained to serve handicapped people.

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