Observation of crossing behaviour in the vicinity of pedestrians subways

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The proportion of pedestrian accidents in Hungary is high and practically unchanged in the last 5 years: it is 22-23% of the total number of accidents. 29% of accidents occurring in built-up areas and 9% of those occurring on rural roads are pedestrian accidents.

50% of the pedestrian accidents are caused by drivers. In 1995 29% of the pedestrian accidents occurred on crosswalks, 8% in junctions without a crossing facility, 2% between the pedestrian refuge island and the pavement, 4% at stops of public vehicles and 57% on other sites. Among 'other sites' are the surroundings of pedestrian subways, where crossing on the surface is especially dangerous. At these sites the drivers don't count with the appearance of pedestrians, they don't accept their presence and right of crossing there and they expect the pedestrians not to restrict their proceeding. [1]

The construction of pedestrian subways is very expensive, but these facilities assure complete safety to their users. Experience shows that many pedestrians don't use the subways and this fact clearly deteriorates their protecting value.

In order to influence pedestrian behaviour, it is important to reveal the characteristics of crossing behaviour, the motives for not using the subways, and the traffic conflicts taking place while the pedestrians cross on the surface. [2]

1 Observation method and sites

1. The pedestrians crossing on the surface were *video-taped*. The observations took place during daytime, in dry weather, in good visibility conditions. The camera could not be seen by the pedestrians. The complete crossing of a selected pedestrian was filmed even then, when another pedestrian started to cross. When evaluating the recordings, the whole duration of the crossing was measured, including the waiting time on the pavement. The direction and speed of pedestrian movement were described (e.g. walking smoothly, in a hurry, coming to a sudden stop, starting to run). The head movements for orientation were also observed.

2. Some of the pedestrians (selected randomly) were *interviewed* right after illegal crossing. The most important objective of the interviews was to reveal the motivations of pedestrians not to use the pedestrian subway, but decide on the dangerous crossing on the surface.

The observation of pedestrian behaviour took place in Budapest, at two sites with high traffic volume, where the pedestrians crossing on the surface have to cross multi-lane roads and many of them are not using the subway, in spite of the inherent risk.

Both sites are near railway stations, with a relatively high number of people coming from the countryside, not being familiar with the surroundings. At both sites the subways are connected to metro stations.

Site I

The pedestrians crossing on the surface cross the two-direction, 2x3 lane road parallel to the subway. The inner lane leads into an overpass and leads the traffic down from there.

If someone wants to cross the road on the surface, he exposes himself to high risk. The vehicles driving up the overpass cause frequent congestion, while those coming down proceed at a speed of 50-60 km/hour or more. It is very dangerous that in one traffic lane traffic is very slow or standing, while in the neighbouring lane vehicles are approaching at high speeds from the opposite direction.

There are no escalators and there is no ramp. Crossing through the subway takes 2 minutes, at a comfortable pace.

Site II

The pedestrians crossing on the surface have to cross a two-direction, 2x3 lane road here, too. In the middle there is a two direction tramway, with a small refuge island on one side, making crossing safer. The pedestrians can wait here until traffic has passed.

There is no refuge island on the other side of the tramway. A dangerous situation may emerge when the crossing pedestrian halts at the edge of the inner traffic lane, to give priority to the tram. In such a case, motor vehicles are passing very close behind the pedestrian and the tram is passing in front of him/her.

At both sides of the 2x3 lane road, there are bus stops in the outer traffic lanes. The placement of the pedestrian subway is unfavourable, because if the pedestrians are crossing the subway to reach the bus stop on the other side, they need to cover a 120 m longer way than the way on the surface.

On one side of the road, the subway is provided with a ramp, while on the other side there are only stairs.

The traffic volume of the road is high and almost continuous in peak hours. Congestion is frequent, traffic gets slower then, sometimes it gets to a halt, which favours the pedestrians intending to cross.

When the traffic volume is lower, there are gaps in traffic because of the traffic signals, making the crossing of pedestrians possible.

2 Results

2.1 Behaviour characteristics of pedestrians crossing on the surface

On site I there were two observation periods in the morning hours and two in the afternoon. The number of illegally crossing pedestrians was the highest during the afternoon peak hours (between 15.30 - 16.30). In this period 18 recordings were made, with 26 illegally crossing pedestrians. During the whole investigation period, in 58 recordings 90 illegally crossing pedestrians were observed.

The estimated age of the majority of pedestrians observed was between 16 and 35. The estimated age was 60-70 in three cases (3%). There were 63 men (70%) and 27 women (30%). 33 pedestrians were crossing alone, the majority however in pairs. 41% of the men, but only 28% of the women were crossing alone.

On site II there were two observation periods in the afternoon hours, between 15.15 - 16.45 and 16.50- 17.50 respectively. During the whole investigation period, in 52 recordings 90 illegally crossing pedestrians were observed, too.

Out of the pedestrians illegally crossing, the majority belonged to the age group of 15-20 year olds. The ratio of those over 60 was about 6%.

Of the pedestrians observed, 49 were men (54%) and 41 were women (46%). At this site, considerably more women were not using the subway, than on the other site. The number of pedestrians crossing alone was 29; 37% of the men and 27% of the women were crossing alone. Because of the relatively high number of illegally crossing pedestrians, pedestrian groups were formed.

There were no serious conflicts on any of the sites. The pedestrians crossing on the surface were completely aware that they had to give priority to the vehicles, they had to adapt their movements to the vehicles. The drivers yielded to illegally crossing pedestrians only in such cases, when traffic jams emerged, and the movement of vehicles was very slow. (Except for one case, when an elderly man was crossing with a walking stick in hand.)

The behaviour observation of young pedestrians showed that they were practised in illegally crossing on the surface. Their movements didn't indicate signs of fear or anxiety. They got used to danger, or they didn't perceive it at all. They were trying to cross in such a way that the time delay be as small as possible. It could be observed several times, that they were walking in many cases on the lines separating the lanes, parallel to traffic, making use of the time during which they had to yield to vehicles. Some of them seemed to tackle the dangerous situation as a challenge, as if they had enjoyed zigzaging among the vehicles.

At site I the majority of the crossings took less than 1 minute. (The longest time of crossing was 77 seconds, the shortest 9 seconds.) In the first phase of the crossing - to the median of the road - the pedestrians were not running. They were looking around and they were

inclined to be waiting for 30-40 seconds with patience. In the second phase of the crossing however, patience was lost and the majority of the pedestrians began running.

At site II, one third of the crossings took less than 1 minute, two thirds took more than 1 minute. The shortest crossing time was 20 seconds, the longest 2 minutes and 54 seconds. The pedestrians usually stopped on the narrow refuge island near the tramway.

The most dangerous behaviour could be observed in the cases of pedestrians who wanted to catch the oncoming bus on the other side of the road. 36% of the illegally crossing pedestrians belonged to this group. Many of them were running, or were crossing the road diagonally. The wish to catch the bus is a strong motivation, which raises the threshold of risk taking and adds to the disregard of danger. In cases when the pedestrian is able to catch the bus, the illegal behaviour will be rewarded and as a consequence of this it will be repeated.

2.2 Motives of illegal crossing

At site I, interviews were conducted with 40 pedestrians crossing on the surface (26 men, 14 women). The average age of the pedestrians interviewed was 28 years, the youngest being 11 and the oldest 63 years old.

8 of the pedestrians were going to catch a train, but only 3 said that they had not used the subway because they wanted to spare time. Further 4 persons reasoned that they were not familiar with the surroundings and didn't notice the entrance to the subway. A 61 year old lady was carrying large, although not heavy packets and didn't want to use the stairs because of this.

Four of the pedestrians crossing illegally (one from Budapest and three from the countryside) were losing their way in the subway, came out at a wrong place and didn't want to go back, they felt it better to cross on the surface. A 21 year old woman reported not liking to use the subway, because of claustrophobia. She doesn't feel it safe to cross on the surface, but she is very cautious, if it is necessary, she will wait for several minutes for the appropriate time to cross.

There were only 2 pedestrians referring to walking difficulties. They were not old: a 47 year old man, and a 50 year old woman.

The illegal behaviour of the other pedestrians (25 persons, 63%) was motivated fundamentally by the desire for comfort. These pedestrians are healthy, they have no mobility handicaps. The majority of them is well acquainted with the surroundings and often crosses the road avoiding the subway. Their primary motivation has been comfort and not time spare. At the same time it was this group that attributed the highest time gain to illegal crossing (5-10 minutes). They were well aware of the illegality of their crossing.

To the question „What changes in the crossing facility would be needed so that you use the subway?", the majority answered that escalators should be built in. Many of the respondents

argued, that the exits and the surface destinations should be marked in a better way. The subways should be kept cleaner and should not be narrowed down by occasional sellers. Several pedestrians mentioned with some self-criticism that not the traffic environment but they themselves should change.

At site II, 22 of the illegally crossing pedestrians (11 men and 11 women) were interviewed. The average age of the respondents was 33 years, the youngest being 15 and the oldest 72 years old.

According to the majority of the pedestrians, the subway was so far away that it can be regarded as „normal" behaviour not to use it. They don't regard crossing on the surface to be against the rules. This may explain the high number of illegally crossing women at this site.

11 pedestrians getting off the metro wanted to catch a bus on the opposite side. 4 of them decided to cross on the surface, because of greater chance of catching the oncoming bus, which might mean time spare for them. 6 pedestrians reported that they never used the subway, they would approach the bus stop on the surface. For them, comfort is the primary motivation, time spare is only secondary. A 20 year old woman reported that she usually used the subway and this was an exception that she had shortened the way because of heavy bags.

Another group (7 persons) were motivated by comfort only. They were not travelling, they were living in the vicinity of the subway.

Four pedestrians chose to cross on the surface because it was difficult for them to walk to the subway. Those people with mobility handicaps are very cautious, they wait for the appropriate time gap. They are familiar with the surroundings.

Most of the respondents were suggesting that the bus stops should be nearer to the subway, or a pedestrian crosswalk leading to the bus stops should be established.

3 Conclusions, recommendations

1. Of the pedestrians not using the subways, the proportion of young people is the highest. They are healthy young people, with no handicaps. Among those not using the subways, a very small proportion (3-5%) are elderly, physically handicapped people.

2. The primary motivation for not using the subways is the desire for comfort, followed by real or believed time spare. In the case of young people, important motives are risk taking, seeking excitement, demonstrating skills.

3. The subways should be constructed in such a way that they offer maximum comfort. It is important to build escalators and ramps. The traffic spaces should be large, congestion should be avoided. Lighting should be near to natural and cleanliness is very important.

4. The exits should be better connected to the stops of public transport and to parking lots. To reach these through the subway should be more comfortable and quicker than on the surface.

5. It is very important to inform the traffic participants on the surface directions and destinations. It is not sufficient to indicate the names of the streets, but the pedestrians should be informed also about the odd or even house numbers and important public buildings.

6. Police enforcement should pay much more attention to pedestrian behaviour. Many people could get accustomed to the use of subways if warning and fines would be more frequent.

The majority of the conclusions and recommendations seem to be evident. However, it is astonishing, how often these principles are neglected, how rarely the fundamental needs of pedestrians are taken into consideration when shaping the traffic environment.

Acknowledgement

Thanks are due to the Ministry of Transport and the Institute for Transport Sciences for funding this research.

References

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