

# Criteria for adequate infrastructure for elderly people in traffic

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## 1. Introduction

The mobility of senior citizens gains on importance on account of demographic, economic and social developments. With the rising life span there grows the wish for active participation of the group 65 and older (65plus) in social life. In this regard also the wish for lasting and independent mobility increases. Securing the mobility of this group owns beside an individual also a social and economic dimension. Many elderly people have mobility or activity restrictions. The architectural and social environment is up to now not concerning these developments barrier-free enough.

The evaluation of numerous safety audits, which were carried out in the context of the auditor trainings at the Institute for Road Traffic Planning and Engineering (SVPT) at the University of Wuppertal was the starting point for the implementation of the project. Thereby it could be assessed that during the planning and up to the structural conversion of road traffic facilities deficits exist in numbers. In many cases weaker traffic participants suffer from these deficits, especially children and elderly people. Besides the problem is how to ascertain the concrete needs of elderly people. Especially under consideration of limited financial resources of local authorities elicitation and evaluation of reasonable measures become more and more important. This development and the unsatisfying situation of senior citizens in traffic lead to the idea, to initiate a research project. The project "Safeguarding the mobility of elderly people in traffic" was commissioned by the Eugen-Otto-Butz-Stiftung, a foundation spending money in projects concerned with traffic safety and mobility education. The project was processed by SVPT together with NeumannConsult (Muenster), a bureau concerned with barrier-free traffic design and Research Centre of Eugen-Otto-Butz-Foundation at Institute ASER e.V., Wuppertal.

## 2. Procedure and results

### Survey area

Within the framework of the project the following two main aims should be examined:

- What are special problems of elderly people participating in traffic?
- What are the demands of elderly people on the road- and road-environment design?
- How far are the interests of elderly people taken into account in today's planning practice? How do we plan today for our tomorrow?

Aim of the survey was to create guidelines for infrastructure design to enable senior citizens a secure and independent mobility as long as possible. Requirements of the elderly people by using different means of transportation (cars, motorcycles, bicycles, public transport sys-

tems and as pedestrians) were considered within this project. Mobility restricted traffic participants and elderly drivers were regarded with special interest.

In order to reach concrete results the main studies were processed in three selected cities in North Rhine-Westphalia (country of Germany). These cities should represent a certain type of city to produce transferable results, if possible. The selection was based on various criteria, as for example city size, structure, centrality as well as percentage of people older than 65 and modal split. The following cities were selected:

- Gelsenkirchen (larger city with approx. 270.000 inhabitants),
- Siegen (medium-sized city with approx. 108.000 inhabitants, hilly area) and
- Luedinghausen (small town with approx. 24.000 inhabitants, lowland).

In order to determine the needs and problems of elderly people, the following different methods were used in these three cities:

- Two-step interviews,
- focus groups (supervised discussion),
- journals of trips and
- accident analyses of the group 65plus.

In addition, it should be checked to what extent the requirements of the elderly people are taken into account at the planning and design of road traffic facilities up to now. For this purpose the most important German regulations for the figuration of traffic facilities were analyzed in respect of details concerning the design appropriate for elderly and mobility-restricted people, too. Furthermore, the utilization of these regulations as well as the degree of the participation of elderly people at the planning process was checked within the three cities.

## Interviews

The interviews were carried out in two stages. In total almost 500 persons were interviewed in the three cities. Within the first interviews the general demographic data was surveyed. For example kind and manner of possible physical restrictions, the preferred mean of transport as well as the respondent's opinion of the traffic facility design. The latter was determined by finding out about importance and the contentment of different features. Furthermore, concrete problematic areas for further investigation were identified in the three cities.



Fig. 1: Elderly people were interviewed by students

The interviews led to a picture that has to be distinguished between the different age-groups. A tendency could be seen, that older people do often not have any distinctive sensibility for problems appearing when moving in the streets. They rather make themselves responsible when difficulties occur. Among the younger volumes the demand for an adaptation of the traffic facilities adequate to their needs can be noticed. In addition, it became clear, that e. g.

social safety as well as lacking regard of other traffic participants are important components for elderly people's mobility.

One point was the so-called mayor question ("If I was a mayor, I would like to..."). This is a proven instrument to get a quick response of what people are really interested in. Some of the results were

- advance traffic signals and refuges/pedestrian crossings,
- appoint city-service and police more often,
- sensitize fellow citizens,
- care for road maintenance,
- barrier-free sidewalks,
- build more and cheaper parking-lots and
- establish more traffic calming.

As follow-up a second questioning was processed within the most mentioned areas, which were rated as problematic. This was used for shortcoming analysis as well as the effectiveness of experience of these places. A partly standardised questionnaire with open and closed questions was used. The complexity of the areas and the safety felt by the seniors was determined using a semantic differential.

The determined traffic spaces (problematic areas) are of three kinds:

- Complex intersections and roundabouts,
- simple intersections as well as
- routes and traffic facilities

### **Focus groups**

In all three cities focus rounds with participation of elderly people and interest representatives were carried out (see Fig. 2). In the focus rounds free discussions took place and were supervised and moderated by a traffic psychologist. In these rounds deficits could be elaborated from the viewpoint of the older people when moving with different means of transport.



Fig. 2: Discussion (focus group) supervised by traffic psychologist

As in the interviews concrete mobility hindrances of older people turned out, standing in connection with social safety (for example angst-spaces). For example the "policeman round the corner" was missed as a contact person. The results of the focus groups were completing the results of the interviews, but in a more detailed way.

### **Reports of trips**

As a supplement to the questioning and conversation rounds reports of trips were filled out voluntarily by some elderly people. In these papers the senior citizens had to report their daily trips in detail for one week. Possible difficulties occurring during moving had to be

named. With this method further deficits and hindrances in traffic facility design could be determined and located. The reports were in parts very detailed and were a good complement to the focus groups and interviews.

### **Rule types and planning practice**

The most important literature in Germany, which was published for the planning and building of traffic facilities, was checked with regard to the details concerning the design appropriate for elderly people. A wide spectrum of literature is relevant: guidelines and standards up to recommendations and relevant expert literature of associations concerned with handicapped needs. Simultaneously a questioning of city planners and traffic designers in the three cities was carried out.

It turned out that there is a great number of publications in particular for a barrier-free traffic design. The requirements of elderly people are in most cases not mentioned explicit. But it could be guessed, that the publications are state of the art and for that consider the needs of all groups of traffic participants.

It could be asserted, that only few publications were used or sometimes they are not known by the planner. The smaller the city, the less publications were used. In smaller cities they use more general guidelines. This is because of merged field of activities of one department. In bigger cities departments are more specialised and because of that use more specialised guidelines. Another point is the funding for publications of the local authority.

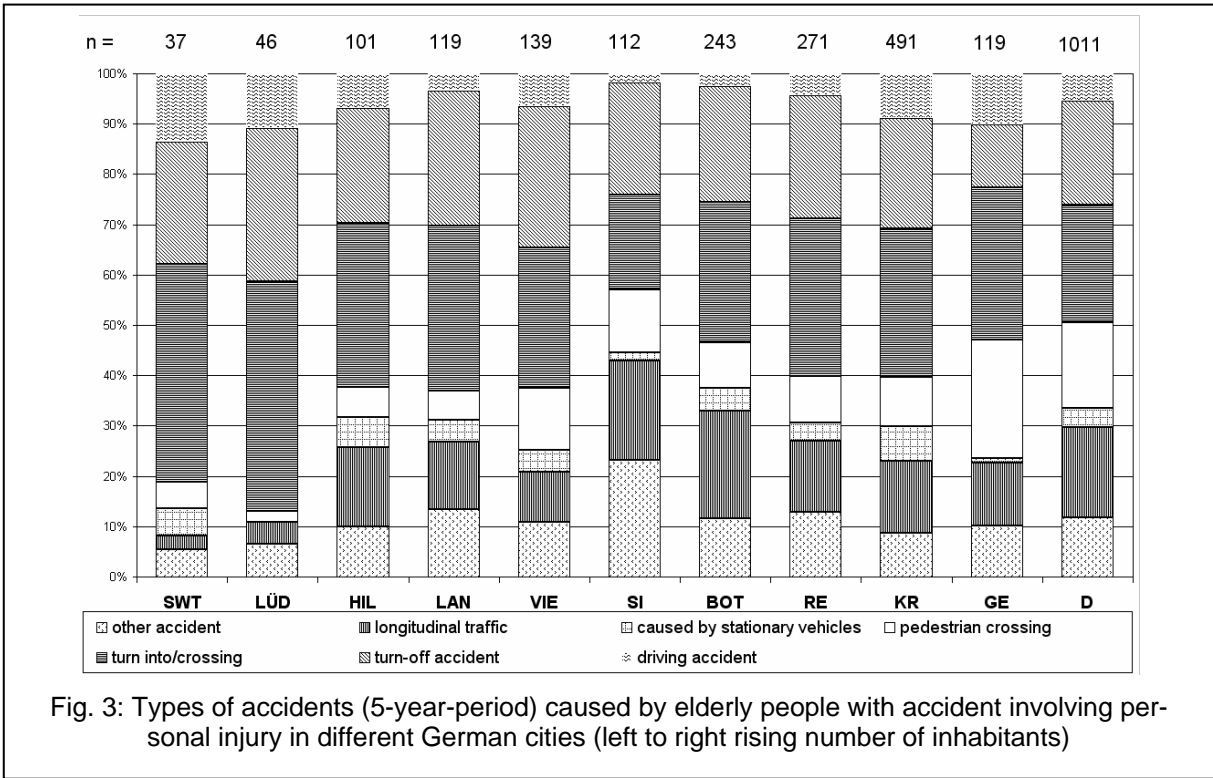
The difficult applicability of the design propositions in the practice, in particular at the reconstruction of existing traffic areas, was criticized. Because of different demands also target conflicts occur frequently. Sometimes specific groups are preferred in the regulations (for example blind people and wheelchair drivers). Supports are missing in order to find agreements without discriminating one group because of favouring another.

The participation of the elderly at the planning process is handled very differently. To some extent a senior advisory board can influence urban planning, but sometimes this advisory board only has a consultative character. Sometimes stakeholders of certain groups of handicapped people have a greater influence. If there are no stakeholders for certain groups, their needs may not be considered. This leads to a preference of the needs of some handicapped. Last but not least the personal attitude of the involved planner is very important. It could be called the "human factor".

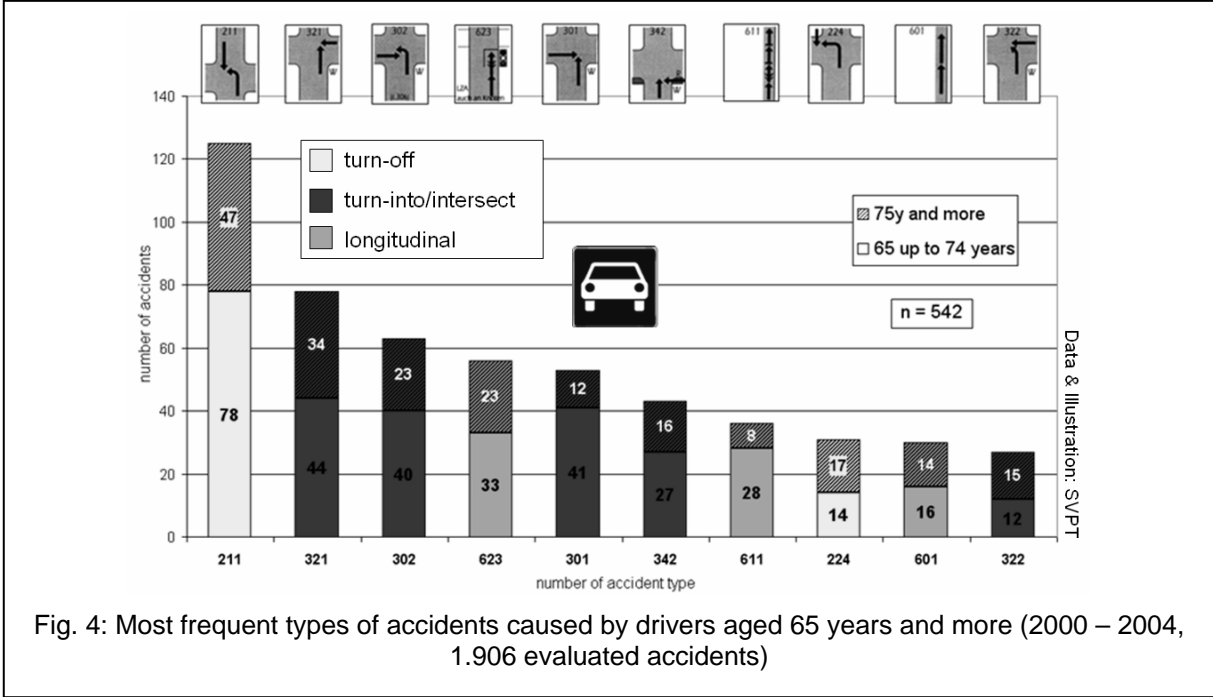
### **Analysis of accidents**

For the analysis of accidents with elderly people involved, another eight cities and municipalities of different size were included in order to get a greater database. The accidents caused by elderly people in a five-year-period were examined. In the three initial cities the accidents elderly people were involved in as pedestrians or cyclists were evaluated additionally. Only accidents implicating the injury of a person were considered. In total a sum of nearly 3.000 accidents was analysed.

Most accidents were caused by elderly drivers (70 %). Another 15 % of the accidents were caused by elderly cyclists, 9 % by elderly pedestrians. A comparison of the cities shows that almost half of the accidents caused by senior citizens happened because right of way was disregarded, independent of the city's size (see Fig. 3). In addition, a tendency is recognisable, that in bigger cities more elderly pedestrians cause accidents. In most cases people were involved in accidents when trying to cross streets with greater excess-speed of cars at places without secured refuge.



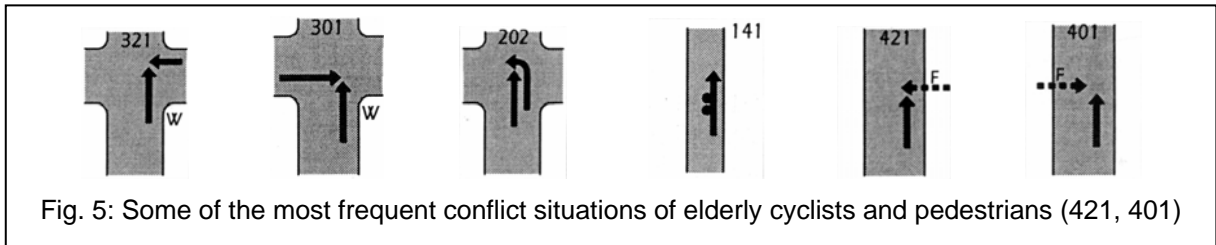
The evaluation shows the most frequent types of accidents of different means of transport. According to this, drivers frequently caused accidents when disregarding right of way-situations. The most frequent conflict situation appears, when at a signalled intersection left-turning traffic and oncoming straight traffic have both green light at the same time (accident catalogue no. 211, see Fig. 4).



Cyclists and motorcyclists are besides priority disregards involved in many driving accidents. Those are accidents, when the driver's losing control of his vehicle. Because of deep analysis of accident causes it can be suggested, that many accidents of cyclists happen due to condition of the road. There were some hints because of the accident type and accident cause, that bad road maintenance may play a certain role. Unfortunately many accident

causes were not exactly specified by the policemen; it was only mentioned “Other mistakes of the driver”. A lot of elderly people had road maintenance as a problem during the interviews and focus rounds.

Line-of-sight obstructions play a subordinate role for accidents caused by pedestrians (see Fig. 5). In most cases elderly pedestrians were crossing the street at places without refuges and without suddenly emerging from behind obstacles. A lot of those accidents happened at bigger main roads with higher speed level.



In the three initial cities maps were made from the collected accident data in order to visualize and recognize black spots. These were subjected to a closer investigation in order to be able to identify possible deficits in the traffic design which have an influence on the origin of the conflict situation. The evaluation showed only few black spots of elderly people. One reason was, that the overall amount of investigated accidents was little by number. The located black spots of the elderly people coincided in some cases with the general black spots. Additionally the accident accumulations were matched with the problematic areas elevated within the interviews. Those match in some cases, in other cases a different scene turned out.



This shows that only the mix of methods could lead to assured results and all problem areas could be identified. Some localities were classified as complex by the elderly people but did not show any conspicuousness in the accident analysis. It can be guessed, that some avoidance strategy is relevant. Certain spaces are consciously avoided by elderly people, because they know they could face some problems there.

### **3. Recommendations for the planning process**

The future need for action for the consideration of the requirements of elderly people in respect of road design is to subdivide into a procedural and a measure-related part. The current traffic planning process is therefore to be completed by following aspects:

#### **Mobility protection plans**

Local authorities should create mobility protection plans for elderly people in the future. Under participation of the affected person-groups, experts should process a shortcoming analysis. Those analysis forms the basis for the choice and prioritization of suitable measures for the mobility protection and improvement of the objective and subjective road safety of elderly people. Mobility protection plans help to

- identify and analyse problems,
- expose positive and deficits,
- draft requirements and
- develop measures and evaluate them.

#### **Integrated planning**

The road design is currently fixed on single plans. It is to be complemented by considerations of a wider area. Therefore the trips and particularly the chains of trips of elderly people have to be taken into account. It does not suffice, for example, to plan a parking place for disabled people without drop the curb or have a barrier-free entrance to public buildings. Those measures are of vital importance, too.

#### **Definition of routes**

Barrier-free planning should not be restricted to new building measures. Instead of this, local authorities have to determine routes, which take the trips of older persons into account and therefore have to be build barrier-free. On these routes existing facilities should be reshaped step by step. On the other hand specific and extensive measures to consider mobility restricted people's need outside those routes could be neglected after an individual case examination.

#### **Enlarged accident analyses**

The usual methods for the evaluation of accidents are to be expanded by specific procedures for the analysis of accidents with involvement of elderly people. Since the accident situation of this group is not always identical with the accident situations of all traffic participants in general, the usual announcement of accident accumulations does not suffice in order to guarantee the road safety of elderly people. Five-year-accidental maps, that show specific black spots with involvement of elderly people should be processed.

#### **Mix of methods for the shortcoming analysis**

The evaluation of accidents does not suffice in order to be able to show shortcoming situations from the point of view of elderly people. Beside the accident analysis further suitable procedures have to be used. Those have to be used to show elderly people's problems with the existing road design. As complement interviews and focus rounds are adequate methods.

#### **Sensitisation of designers and decision makers**

Traffic planning processes aim at the present very much to dimensioning and capability considerations. Responsible actors have to be informed about specific needs of elderly people and they have to be trained in order to be able to arrange the always necessary appreciation of values comprehensively under knowledge of all needs.

Within the framework of the measure development, attention is to be paid to the following requirements:

#### **Design for all**

Measures which do justice to all target groups should be used at new building plans and at the defined routes. Fundamentally the „two-sense-principle“ is to be used so that in every in-

dividual case at least two senses, for example with tactile ascertainable elements and optically contrasting elements should be appealed.

A sustainable traffic design should not aim on special handicaps or certain attributes like age. The requirements of all traffic participants should be taken into account. But, public space is too complex to fulfil the needs of all requirements. Therefore traffic design should consider all needs and available resources and find optimized solutions, which accord to minimum criteria for barrier-free design.

### **Change of viewpoint**

While planning traffic areas, it has to be taken into account that the target group will change in the future. In the future there will be more and more elderly drivers – due to more older driving women – and there will be less blind and more visually handicapped persons, less deaf but more aurally handicapped persons and less wheelchair drivers but more persons with a mobility handicap.

### **High-contrast design**

The architecturally preferred and often used “grey-in-grey-design” (see Fig. 7) is to be replaced by colours and particularly by contrasts. There a lot of possible variations for high-contrast elements – contrasting safety splitting strips are required for example between lanes for cars and pedestrians and between walking- and bicycle-lanes on the same level. Down-falls of elderly pedestrians and elderly cyclists because of stumbling edges or bad road maintenance are leading to severe injuries. Road maintenance has to get more priority.



Fig. 7: Frequent traffic facility design: Few contrasts

### **Reduction of complex traffic situations**

Black spots with involvement of elderly people happen most frequently at complex facilities. It is generally necessary to simplify traffic processes. The following examples are very promising:

- Consistent protection of left-turning vehicles due to time-delayed releasing at intersections with traffic lights to avoid conflicts with oncoming traffic,
- abandonment of non-signalled right-turning vehicles as well as
- conversion of not signal-controlled junctions to roundabouts, as far as the pedestrians and cyclists are not restricted by this.

Local mobility protection plans with measures as mentioned above should help to close the gap between requirements of the user and law on the one hand and possibilities of traffic design on the other hand. The measures taken into account to improve mobility of elderly people are as a general rule useful to all traffic participants and help to plan safe and sustainable.