



## Why do accidents with vulnerable road users happen?

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### Introduction

While the proportion of car users in traffic accidents with personal injury has decreased in Germany in recent years, the proportion of vulnerable road users has increased [1]. The largest increase was recorded among cyclists. This increase can also be seen in the distribution of the accidents that are reported by the police to the Audi Accident Research Unit (AARU). AARU is a cooperation between the Regensburg university medical center and AUDI AG. AARU analyzes traffic accidents in an interdisciplinary way with the aim of learning from accidents. Although the AARU data is not representative, it does provide a deeper insight into the traffic accidents that were investigated in more detail.

### Method

The AARU consists of three different teams working simultaneously. Technicians analyze the accident site and the vehicles involved and, based on this, carry out a physical reconstruction of the accident. Medical experts analyze the injuries of the persons involved, the biomechanical sequence of events in the accident and the recovery of the patients. Finally, psychologists interview the drivers involved in the accident about the subjective perceptions immediately prior to the accident and analyze how the accident occurred. The data of the standardized telephone interviews are matched with objective information from technical reconstruction to get a deep insight into the course of the accident as well as the accident causation. To describe the causes of accident in a detailed manner, the 5-step method was developed in this research project [2]. In this context, human error is divided into five categories: information access, information reception, information processing, objective and action. Each category consists of characteristic criteria that could have led to an error within that category to describe the human failure in detail. Whereas earlier attempts were made to attribute accidents to a singular cause, in the further development of the 5-step method several causes of accidents are now considered over time. The results of the accident analysis can then be evaluated according to different aspects.



## Results

By now, the AARU has analyzed more than 1,600 road accidents. These are mainly accidents involving passenger cars only. However, almost 12% of the accidents involved vulnerable road users. If the accidents are subdivided depending on the person who caused the accident, there are clear differences in the distribution of the causes of accidents. In accidents caused by car drivers, the error often lies in the information reception. A major problem is a wrong focus of attention, which means that the vulnerable road users were not noticed. In accidents caused by motorcyclists, there was often a problem with the objective, such as speeding. Besides that, errors in the execution of the action, e.g. braking too hard, were often the cause of the accident. If cyclists caused the accident, there was also often an error in the objective. However, these were mostly disregard the right of way or the use of the wrong side of the road. In the case of accidents caused by pedestrians, on the other hand, most causes of accidents lie in the information reception. Low activation by alcohol plays a role here, but also accidents in which children were unable to perceive the traffic situation properly due to their stage of development. In many accidents with VRU, a sight obstruction often has an influence on the occurrence of the accident.

## Conclusion

The detailed overview of the causes of accidents using the 5-step method makes it possible to show the differences between the different accident constellations. This creates a basis for clustering accident mechanisms and specifically looking for countermeasures. The aim is to completely avoid such accidents in the future.

## References:

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