



Bundesministerium
für Verkehr und
digitale Infrastruktur

Increasing the road safety of older drivers by improving their visual awareness using the 'field of view assistant'

TF on FVA
21st October 2020

Agenda

1. Background
2. BAST-Study
3. Results
4. Open issues

Background

- Senior road users gain more attention of traffic psychology and accident research in the recent years
- Driving errors made by elderly drivers in accidents differ from those by younger people
- Errors can be traced back to particular age-related decline in sensory, cognitive and motor capabilities
- Reduction of the “Useful Field of View” (UFOV)
- Decreased reaction times and accuracy levels of elderly’s responses to bilateral peripheral light signals in the 60° visual angle compared to stimuli at 20°

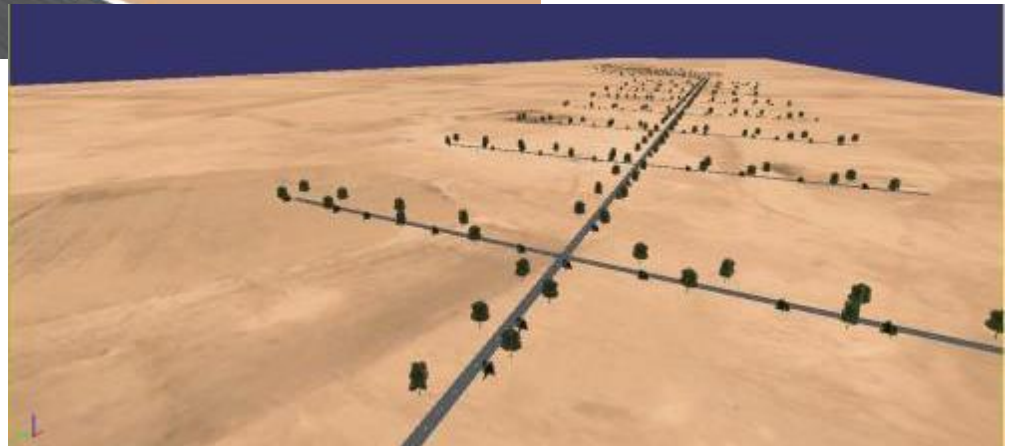
BASSt-Study

- How could a “Visual Field Assistant” may help drivers (especially elderly drivers) to recognize traffic-related objects in the peripheral field of view?
- Transferring peripheral traffic information to the central field of vision
- Reduce response time and increase responsiveness
- Simulation scenario consisted of a dense sequence of many similar intersection situations (experiment 1)
- More realistic scenario (experiment 2) with fewer intersections, but more diverse situations concerning right of way

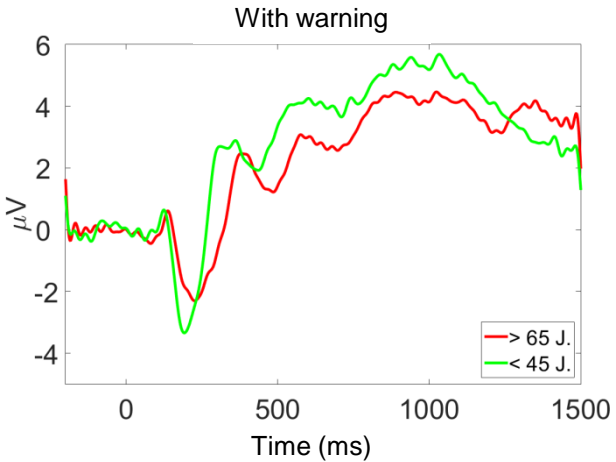
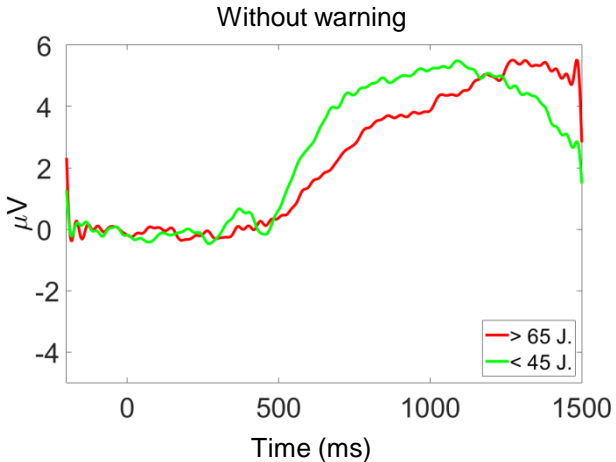
BASSt-Study

- Group of seniors (65+) was compared to a younger control group
- Brake response times and eye-tracking data were recorded
- Drivers had to give the right of way at intersections
- Vehicles appeared in in the periphery of the field of view (at a visual angle of 60°) – in half of the cases with an additional, centrally positioned warning saying “Caution!”
- Participants had to brake when they get this information

BASt-Study



BASt-Study



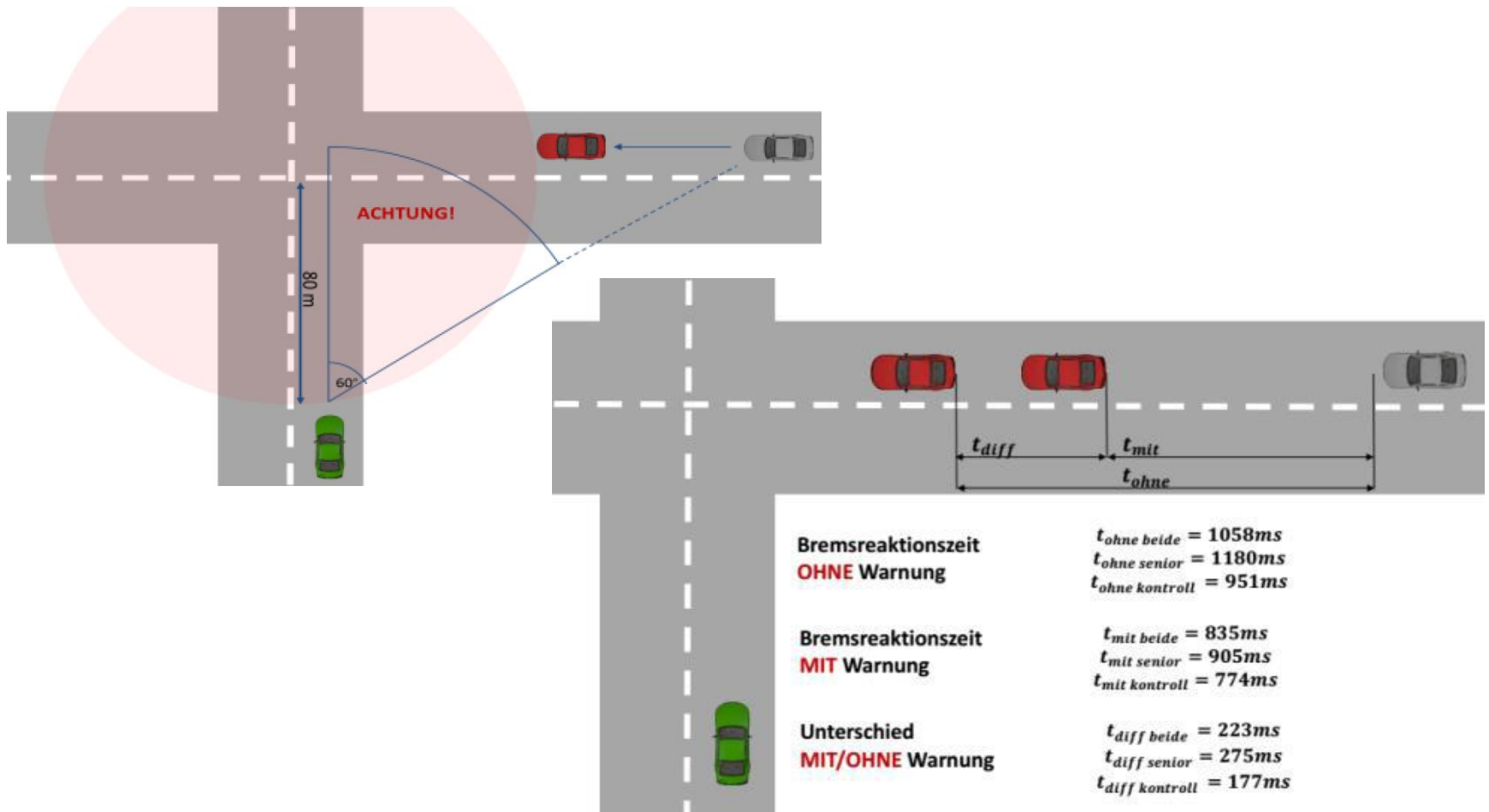
Results

- The results show that both age groups responded faster to cars in the periphery in trials with a centrally located warning
- Seniors responded significantly slower in experiment 1, and by tendency in experiment 2
- Eye-tracking data indicated that in both experiments cars in the periphery of view were not fixated but seen in peripheral vision, as it was instructed
- The results point to a more constant, earlier processing of visual stimuli when a centrally positioned warning stimulus was presented

Results

- Field-of-view assistance renders to be a promising approach from the perspective of perception psychology, and has proven feasible in the simulator while producing good results
- Brake response times were reduced, evidence in eye-tracking data pointed to an earlier reaction
- Older participants benefited even more from the warnings than the younger ones
- The need for assistance and research for older drivers is high, especially at intersections and junctions where a lot of visual information from all sides can be relevant

Results



Open issues

- For practical application in cars, further research should be conducted on the position and display, and especially the kind and character of such warnings
- It must be taken into account that older people sometimes have different preferences or react differently to assistance systems than younger people
- The previous studies have not yet been able to clarify all open questions that are relevant for the development and actual application of such visual field assistance systems

Open issues

- Recommended to focus on the concept or the type of Warning and on the design-side handling of the reliability of the warning in further studies
- Warning from a driver assistance system in a real driving environment should not trigger any immediate action (in the test design, immediate braking) based solely on the information delivered by the warning, since this can also be faulty
- System should enable the drivers to use the warning information to determine the current traffic situation more quickly and more complete in order to then decide for themselves whether a reaction is appropriate

Open issues

- Senior citizens in particular react more quickly to warnings that call for action, such as "Stop!", than to informative ones, but a roadworthy warning system should not suggest one hundred percent reliability
- For a visual field assistant, it would not be appropriate to trigger a quick, but not reflected action with a message calling for action
- It should be examined in user tests how these two aspects can be optimized in order to contribute to increased driving safety
- A number of factors should be investigated and balanced in the course of development for the usefulness of a field of view assistant, including the type of warning, its timing, types and locations of triggers and traffic situations

Open issues

- Further design and technical questions about the development of a field of view assistance have not yet been dealt within the study, for example the optimal display method or the best location in a head-up display
- Older drivers in particular seem increasingly to assume that ADAS are always reliable and only give correct information, and trust the system too much, which could lead to danger in some situations
- The study only evaluates the possible positive effects of a fictitious system under ideal conditions.
- The interaction with other information systems is not part of the study.

Thank you for your attention