

Fit to Drive

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Welcome

Better drivers with assistance systems?

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- Do we need better drivers?

- In Germany:

- 300.000 km for one crash
- 0.000003 crashes per kilometer

- Drivers are able to handle even complex situations very well

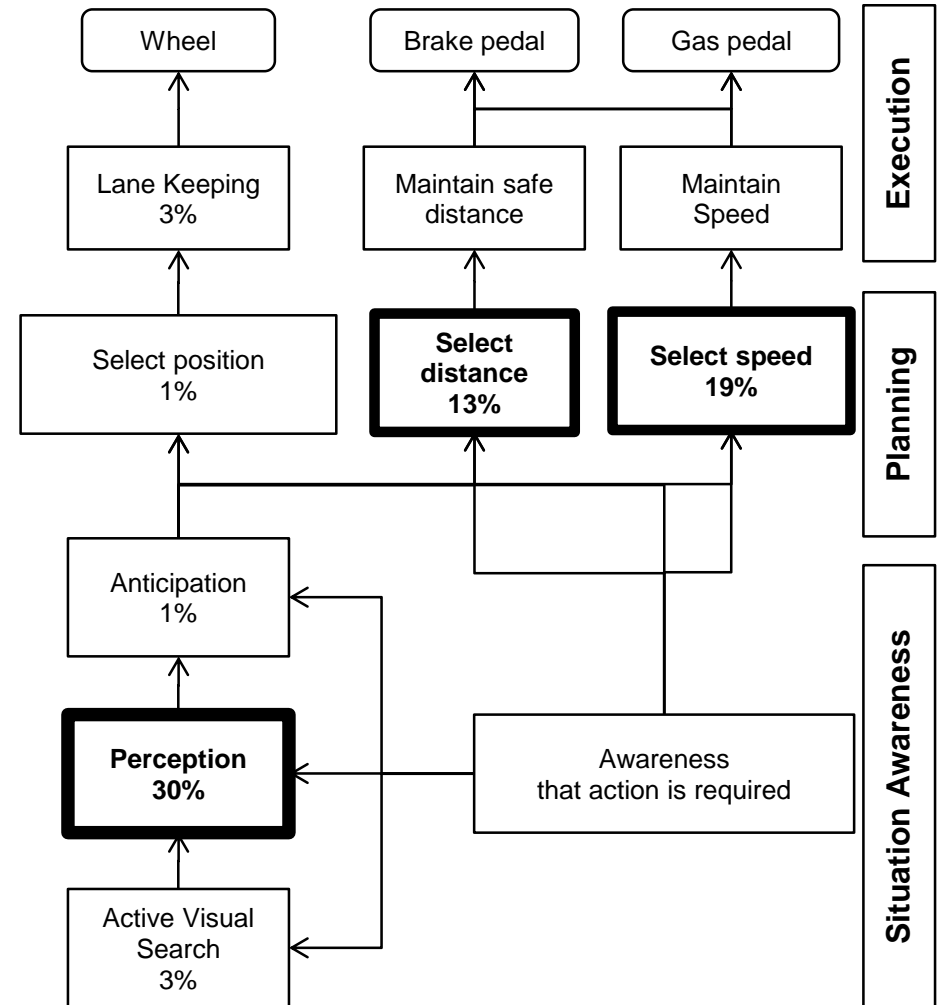




- Driver errors are involved in nearly every accident



- In-depth accident study
 - Braunschweig, 2002
 - Three main error types
 - 62% of all severe accidents



Vollrath (2010)

- Inadequate attention allocation (Werneke & Vollrath, 2011)



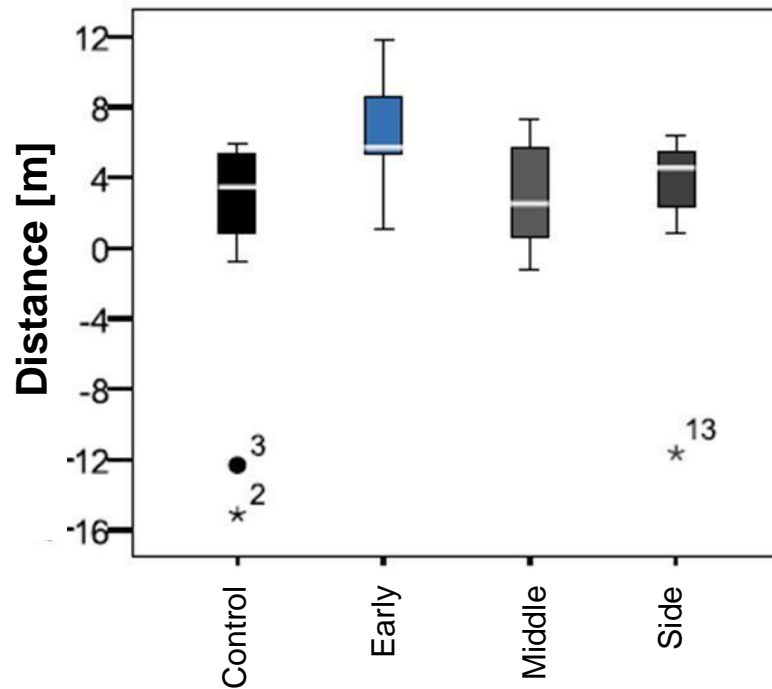


- Different warning concepts to prevent this crash

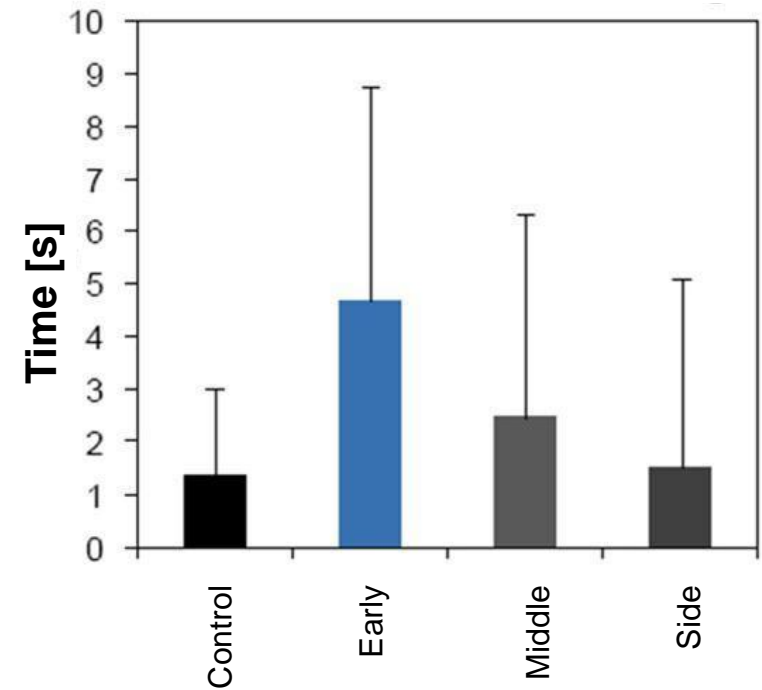


- Effect of the warning

Minimum Distance



Waiting at the Intersection





• Forward Collision Warning and Intervention

Muhrer & Vollrath (2011)

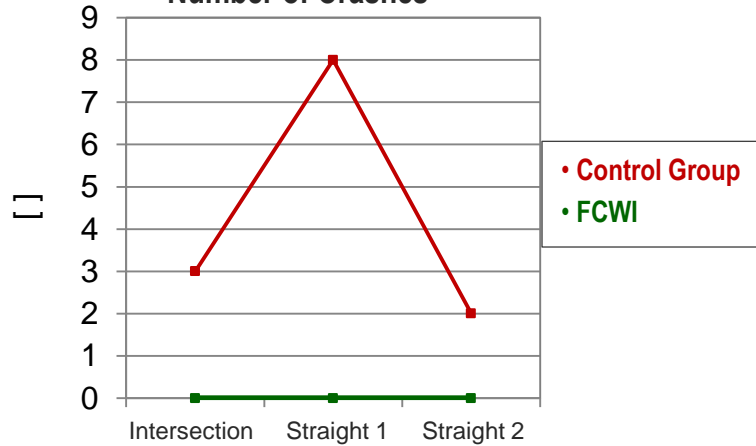


- Car-following in a town
- After half an hour:
 - Lead car brakes abruptly at a straight road
 - Lead car brakes abruptly and turns off at an intersection without signalling beforehand
- Driver Assistance System FCWI:

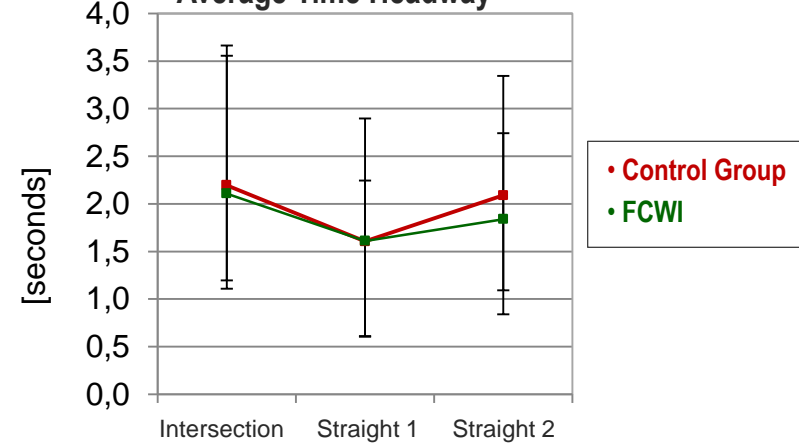




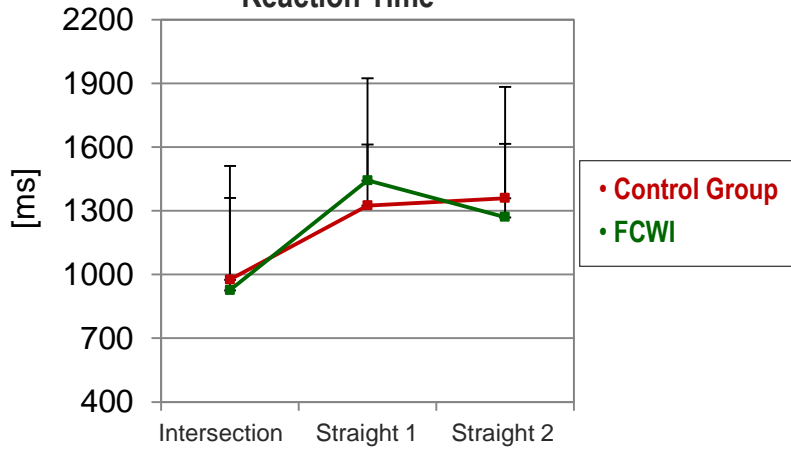
Number of Crashes



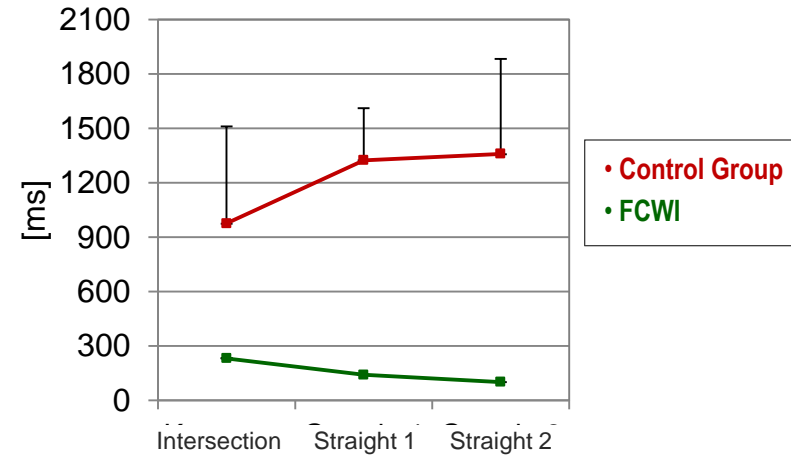
Average Time Headway



Reaction Time



Reaction Time of the System





- Intelligent Speed Adaptation (ISA)



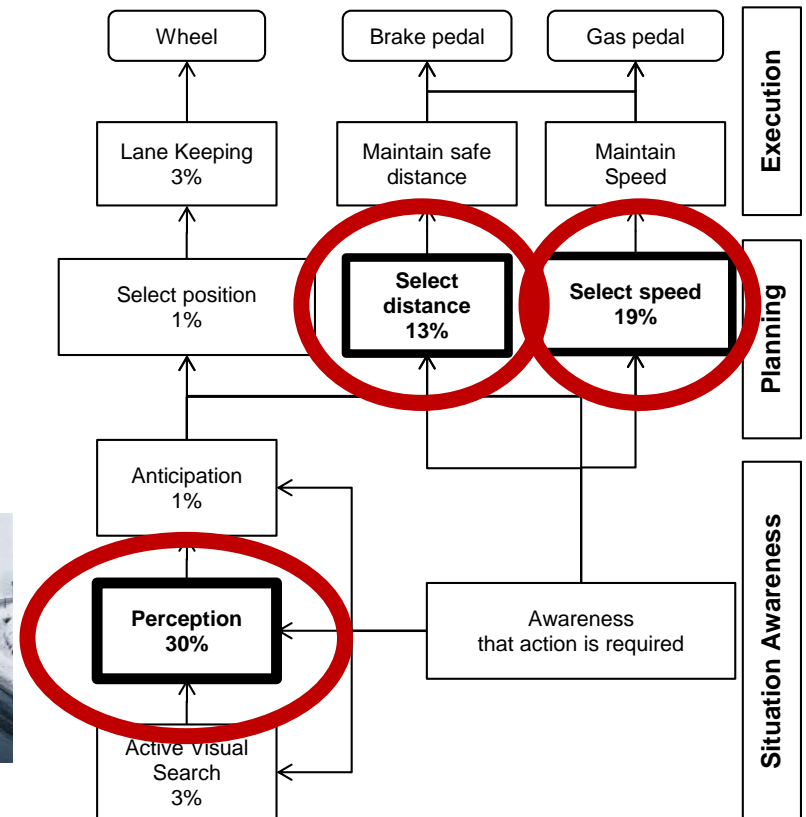
The safety effects that current ISA technology can deliver are already impressive. Research has shown that advisory ISA can achieve an 18% reduction, and non-overridable intervening ISA a 37% reduction in fatal accidents in the UK³. In other EU countries, up to 50% of traffic deaths could be avoided if all cars were equipped with supportive ISA⁴.

ETCS (2006)

<http://www.etsc.be/documents/ISA%20Myths.pdf>

• Safer driving with Advanced Driver Assistance Systems

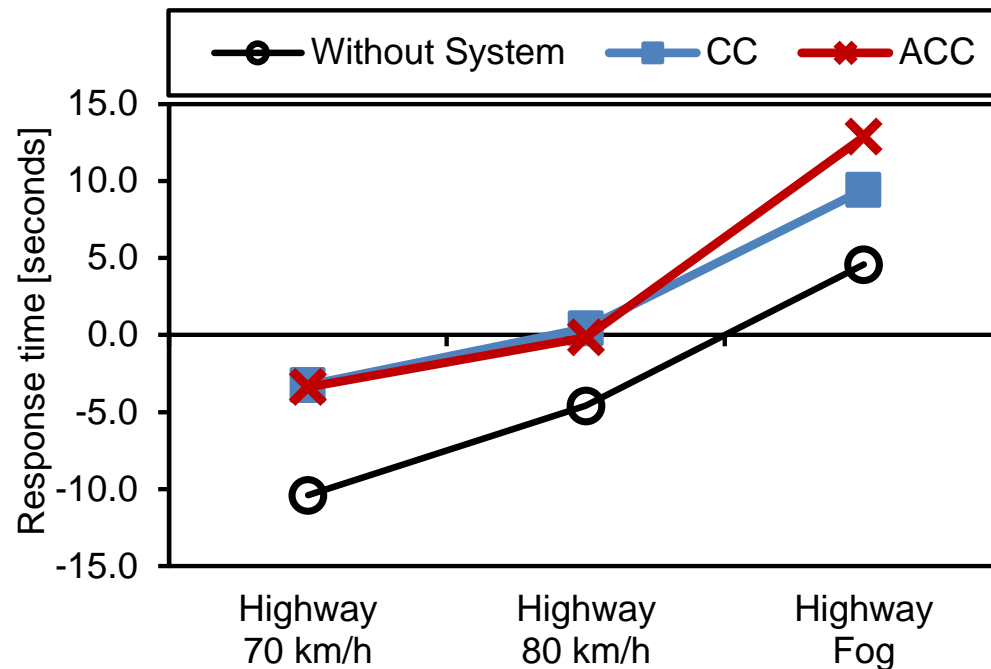
- Perception of critical objects
- Keeping the distance and braking
- Selecting appropriate speeds





• Cruise Control (CC) and Adaptive Cruise Control (ACC)

- Vollrath, Schleicher & Gelau (2011)





- Improving ACC: ACC+
- Niederée & Vollrath (2011)
- Automatic adaption of speed in curves

- Different HMI:

- Color / Size

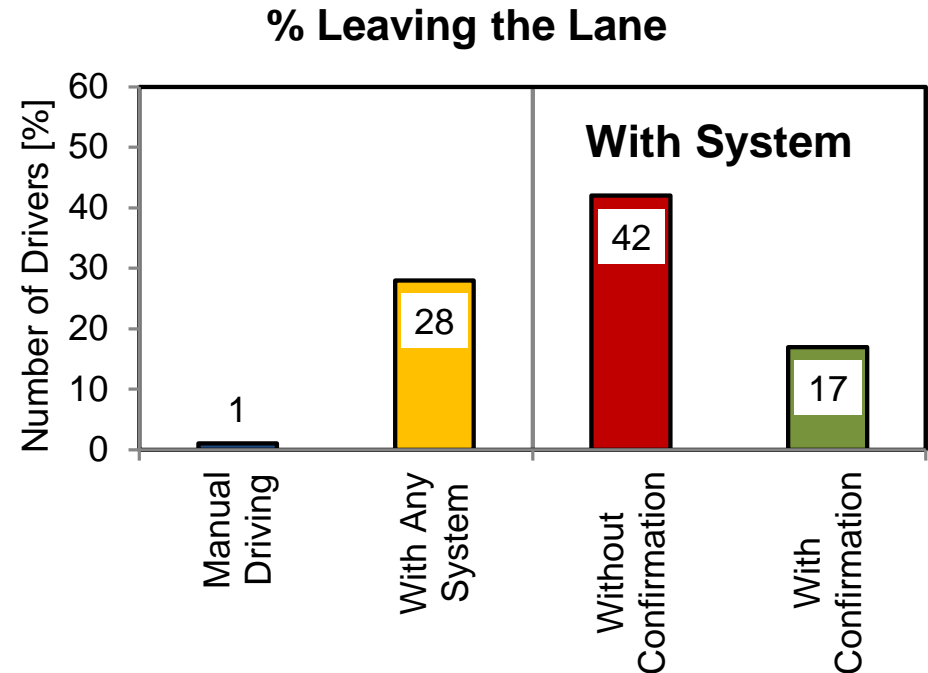
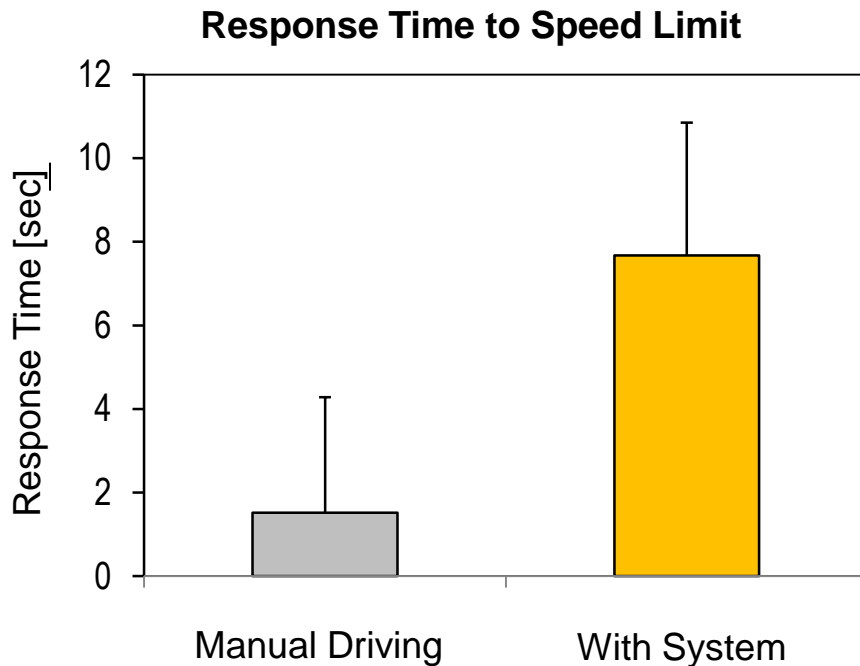


- Without or with confirmation



- System failure at curve #50: Driving with 100 km/h
 - System has no information about the speed limit (60 km/h)

- How does the driver react?
- What are the results?



- Better drivers with assistance systems?
- **Yes:**
 - Improving perception, safe behavior, emergency brakings
 - Prevent crashes (3 systems, more than 60% crashes)
- **No:**
 - Driver is „out of the loop“
 - Systems are not as able as drivers
- ADAS **for error prevention**, but **not for increased comfort**