

Research on the LISA-2-Alert System

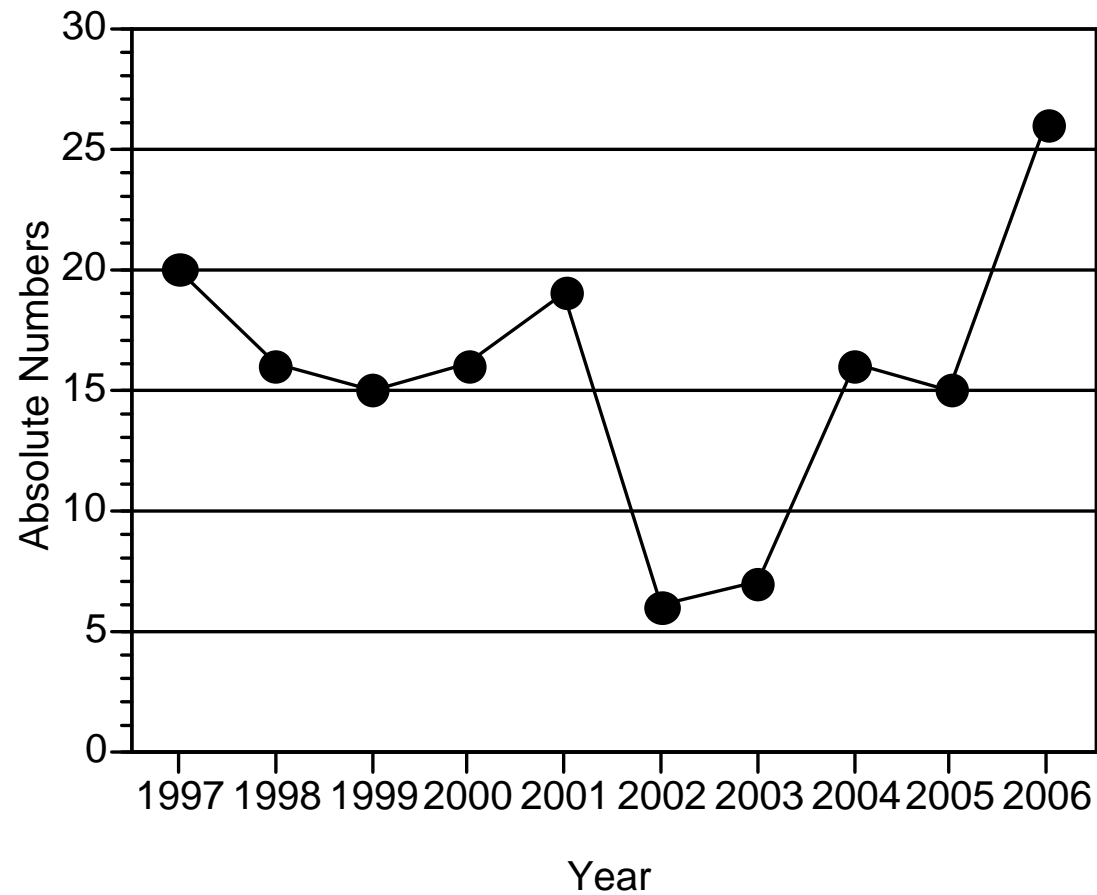
Henri Christiaans en René van Egmond

Met dank aan:
Jaap Breeuwer
Dorus Galama
Christiaan Kieft
Thijs van Schijndel
Mart Veeken

1

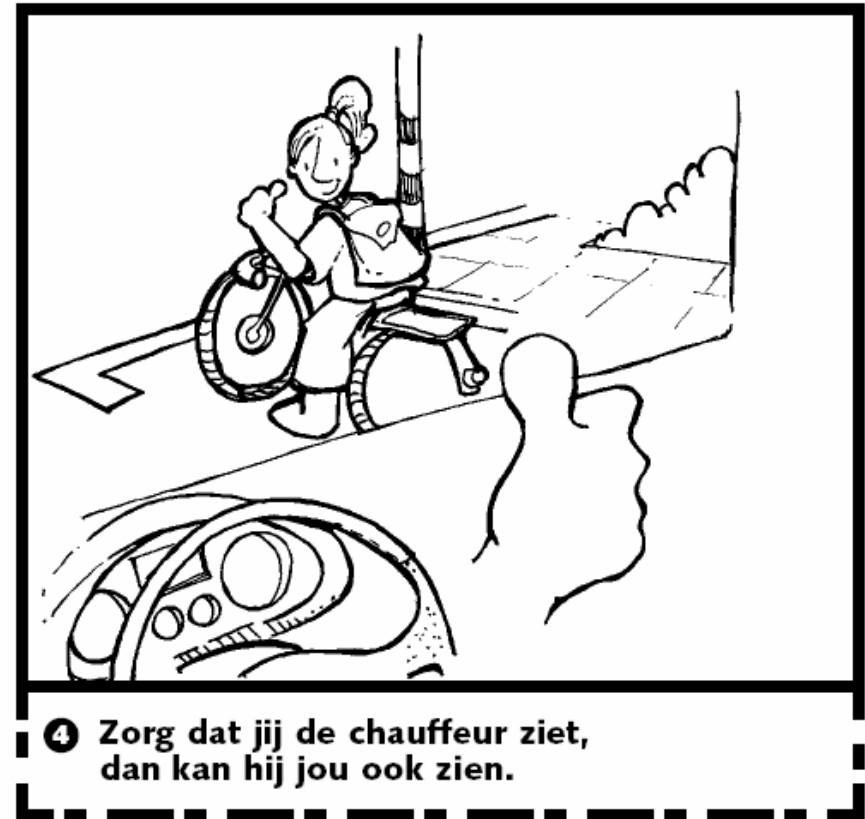
Increasing number of victims

People killed by right-turning trucks



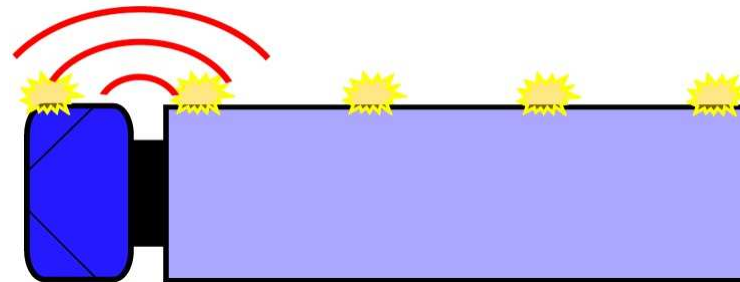
Blind spot mirror

Doesn't work well:
the number of victims
has increased again.
Possible cause: Cyclists in
front of the car will not be
observed








Lisa-2-Alert System

Does the Lisa-2-Alert system contribute to the safety of traffic situations where cyclists drive or stand beside right-turning trucks?



Lisa Sound

- Sound standing still 
- Sound standing still + Engine 
- Truck driving back + forward 
- Higher urgency alarm sound 
- Higher urgency + engine 

Aims of the LISA-2-Alert system

- To alert cyclists for the danger of a right-turning truck
- To alert the driver for being aware of cyclists
- To design a signal that is enough urgent and (after a while) gets meaning for the cyclists: they will recognize it as THE signal for right-turning trucks (compared to e.g. backward moving trucks)

Aims of the LISA-2-Alert system

- To alert cyclists for the danger of a right-turning truck
- To alert the driver for being aware of cyclists
- To design a signal that is enough urgent and (after a while) gets meaning for the cyclists: they will recognize it as THE signal for right-turning trucks (compared to e.g. backward moving trucks)

Supposed disadvantages of the LISA-2-Alert system

- A responsibility shift from the driver to the cyclist.
- The sound is too noisy in public space
- Adaptation of the cyclist to the sound. Will the sound remain alerting?
- It doesn't cope with the problem of the cyclists who are in front of the mirrors

Counterarguments regarding disadvantages of LISA

- Responsibility shift:
 - o Observation shows that the cyclist lacks any responsibility
 - o The 'Deartruck' investigation has shown that the driver is also more alerted by the system
 - o When the system is effective: 'the end justifies the means'
- Sound problems:
 - o can partly be solved by doing research on sound pitch, loudness and urgency (multiple sources)
 - o Giving meaning to a sound opposes the adaptation argument. Recognizing the sound keeps the cyclists alert
- Cyclists in front of the car: whether LISA helps here needs to be studied.

Research methods

Four methods applied in this field:

- Document studies (e.g. of accidents)
- Retrospective studies (e.g. with drivers and victims)
- Direct observation studies (e.g. videotaping real situations)
- Laboratory studies

Observation methods

- Direct observation by videotaping the real situation
- Interviews with cyclists and driver on the spot

Camera 1: video of the driver



12

Camera 2: front to back



QuickTime™ and a
H.264 decompressor
are needed to see this picture.

Camera 3: back to front



15

QuickTime™ and a
H.264 decompressor
are needed to see this picture.

Study 1

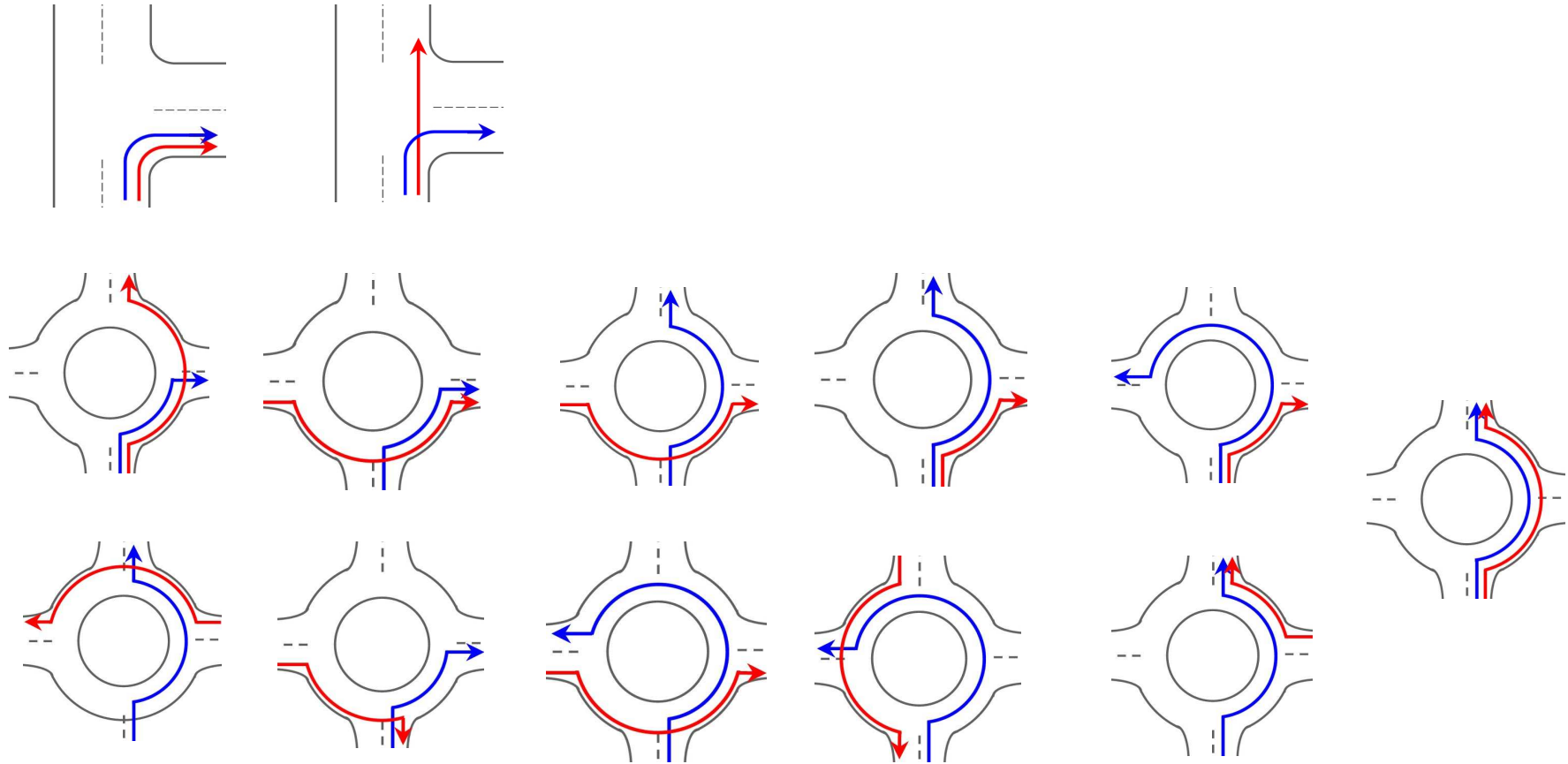
Observation 1: Making use of the GAD truck in Bussum, Laren, and Huizen

The observation was conducted in Bussum, Laren, Huizen, and Delft

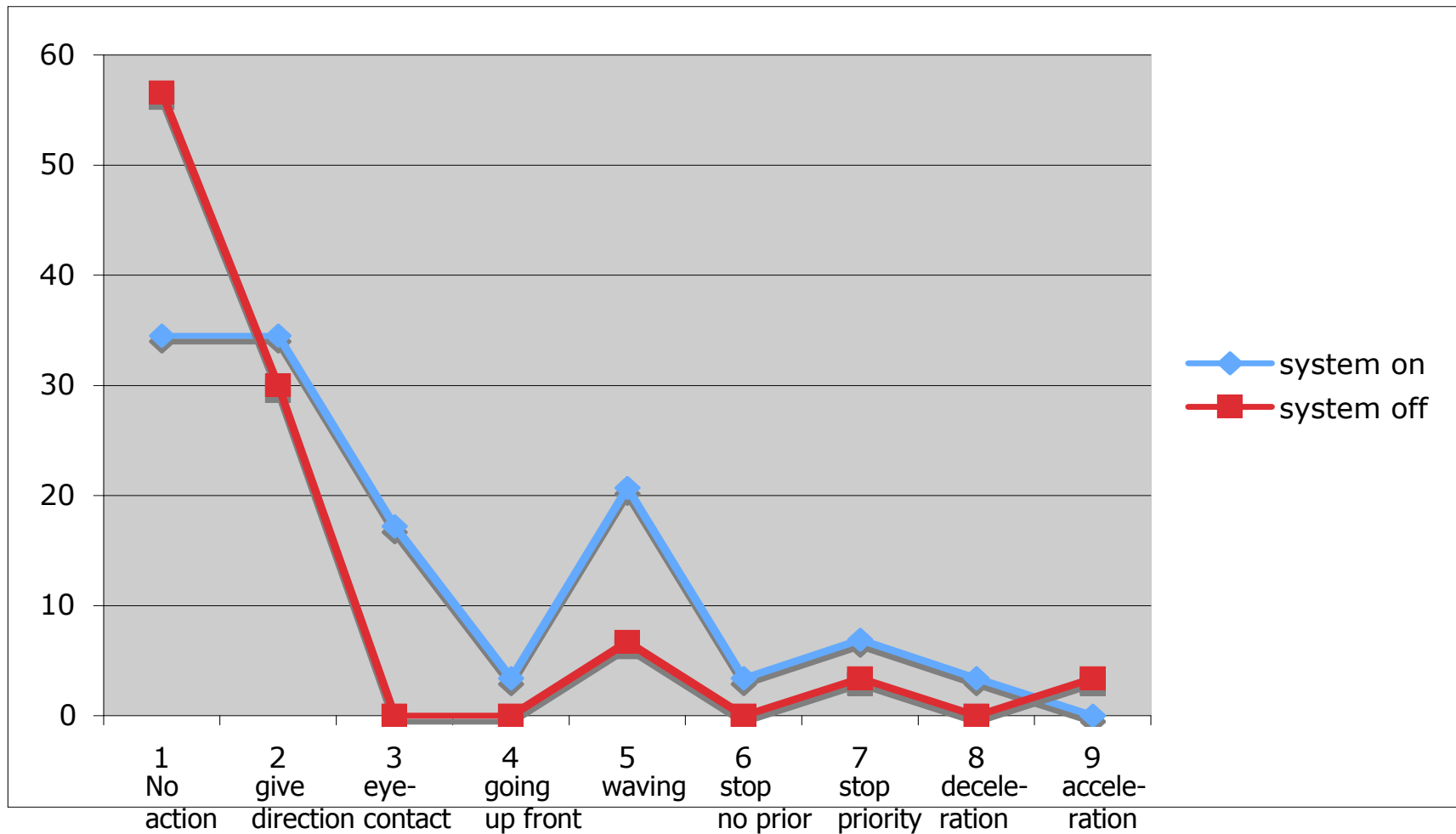
Study 1: Equipment

- Camera 1 recorded the view similar to the right-sided mirror.
- Camera 2 was hand-held by a researcher in order to register any sudden unexpected move like going up front of the truck could also be captured.
- Camera 3 registered the truck driver. It was positioned on the dash-board in front of him. Also his verbal reactions and answers to interview questions were captured.

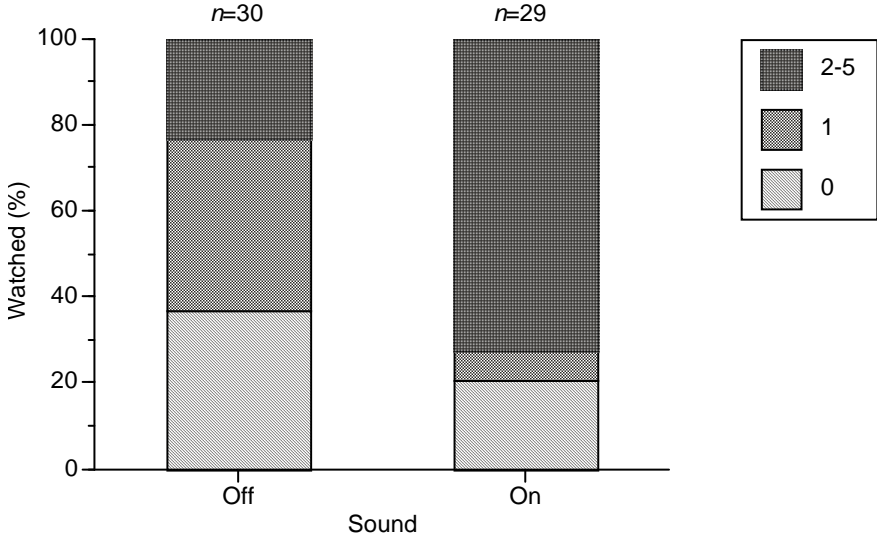
Study 1: Routes



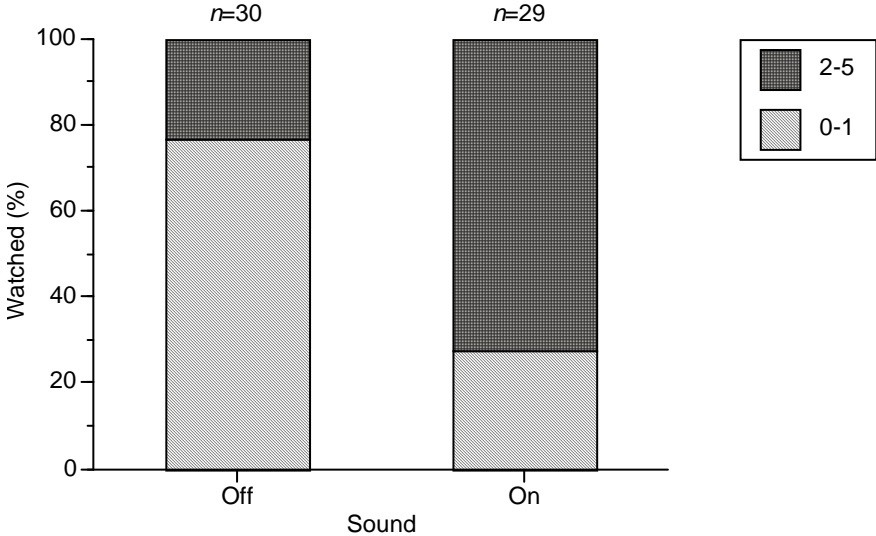
Actions by cyclist



Bussum Video Observations



$\chi^2(2)=16.73, p<.001$



$\chi^2(1)=14.88, p<.001$

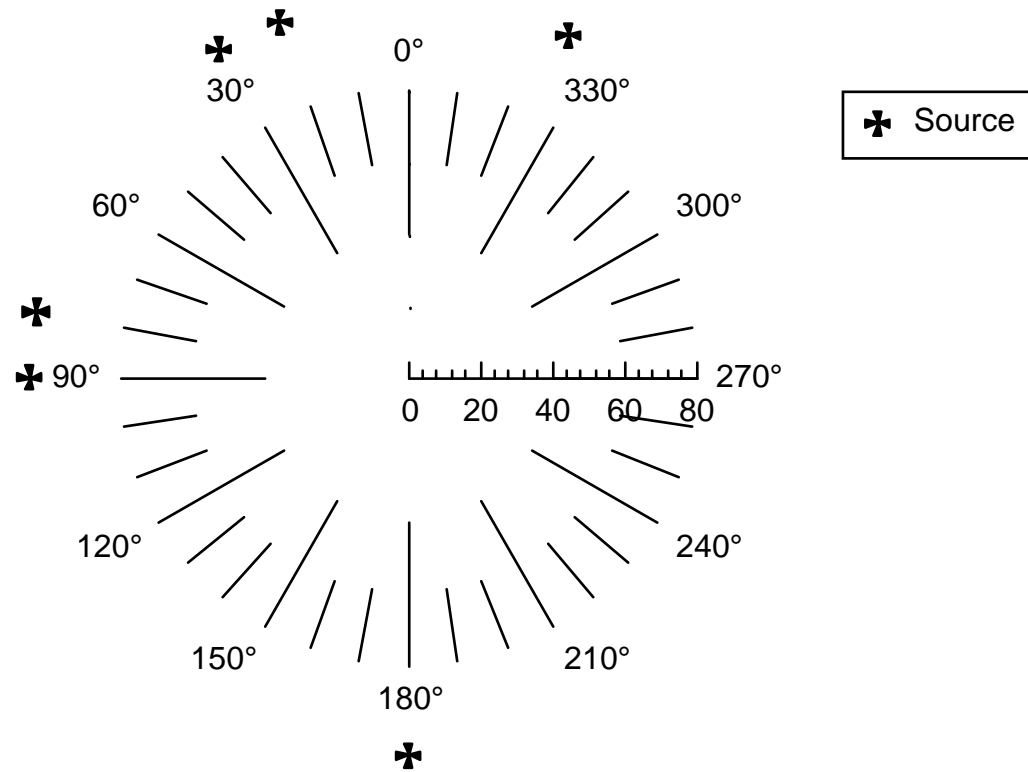
Directional hearing

- Between-within subjects design
- Between variable: Engine on ($n=15$)/off ($n=15$)
- Within variable: Angle of hearing (6 levels)

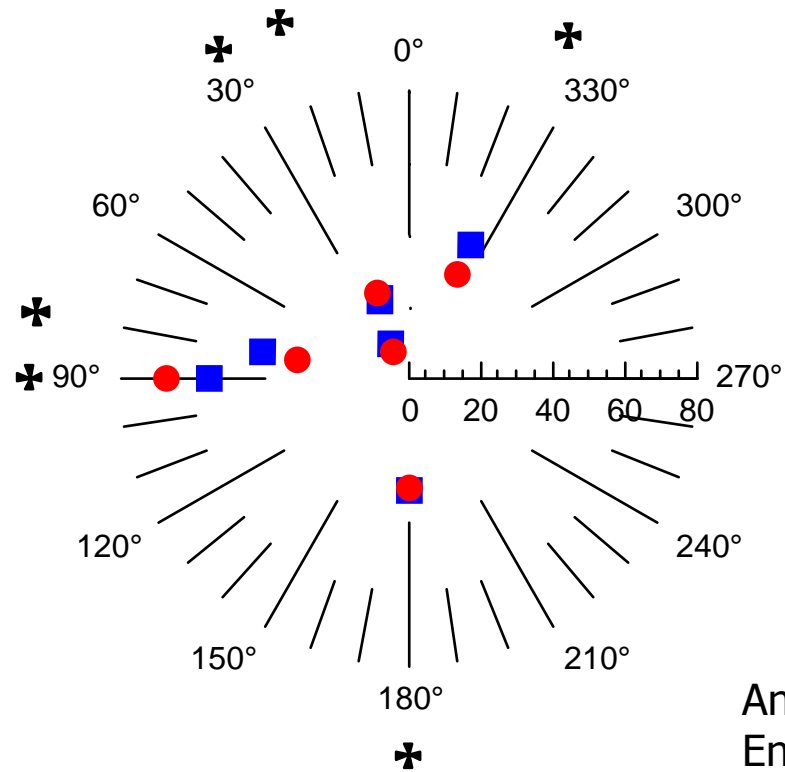
- Task indicate direction with turning knob (visual feedback on screen)

- Dependent variable: Deviation in degrees

Source Direction



Results: Directional hearing



Study 2

Observation 2: Making use of the GAD truck in Amsterdam

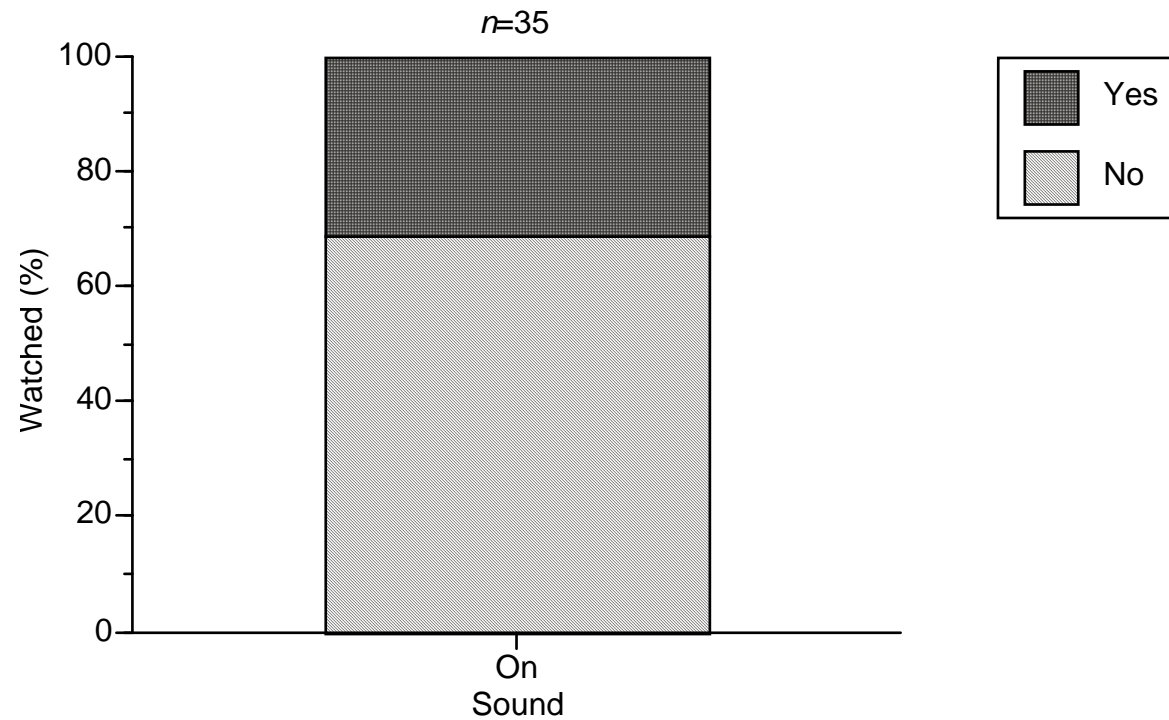
The experiment was conducted in Amsterdam. Stadhouderskade.

The traffic situation is a crossing, with traffic lights. The truck takes a right turn. This is repeated 20 times.

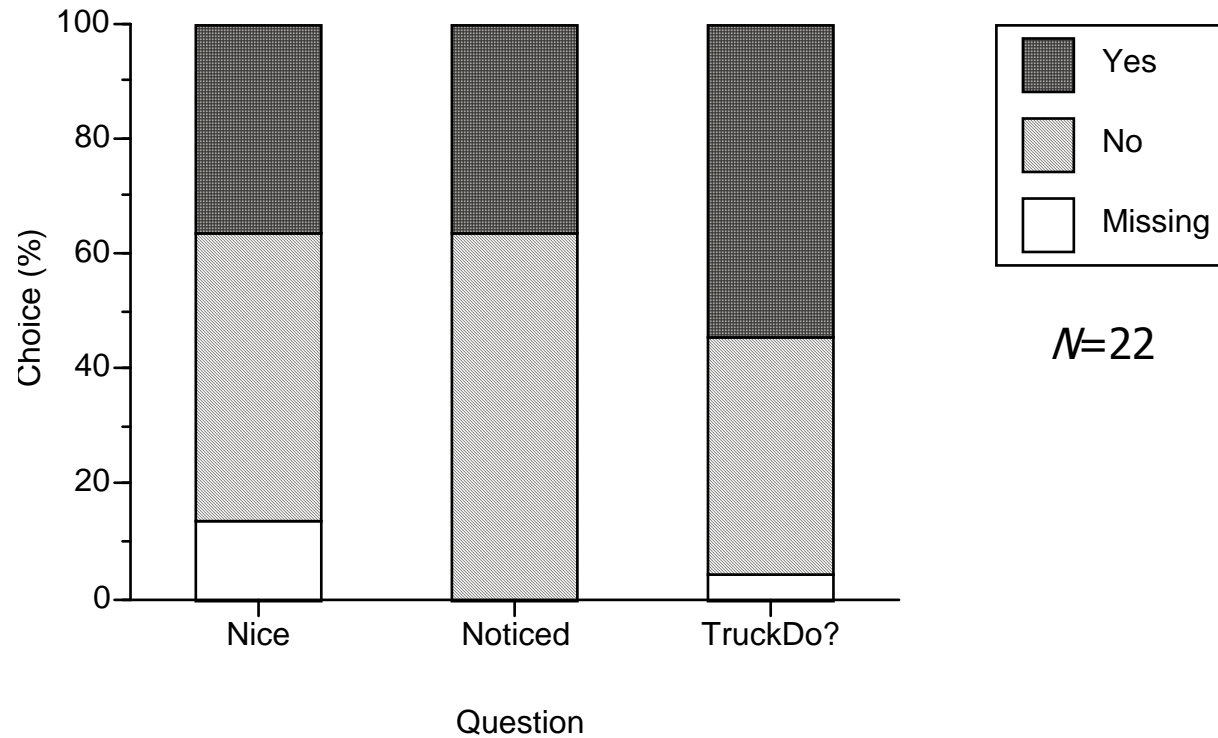
During the experiment a number of cyclists haven been interviewed.

Sound could not be switched off

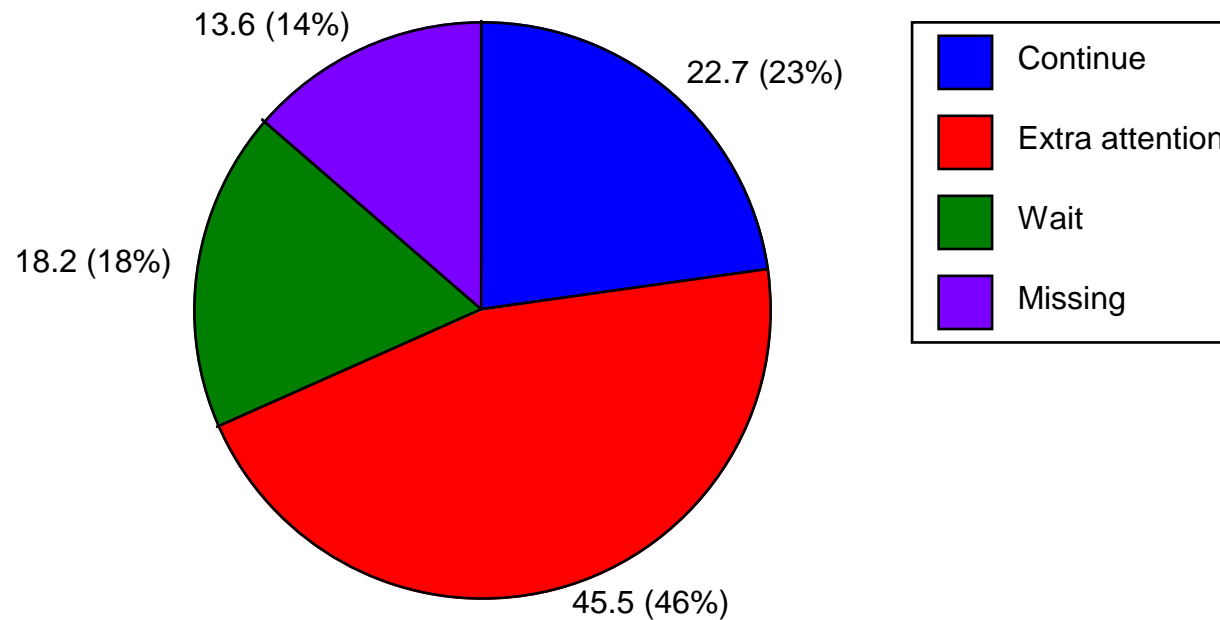
Amsterdam: Stadhouderskade



Results: Questionnaire



Results: Questionnaire, action



Study 3

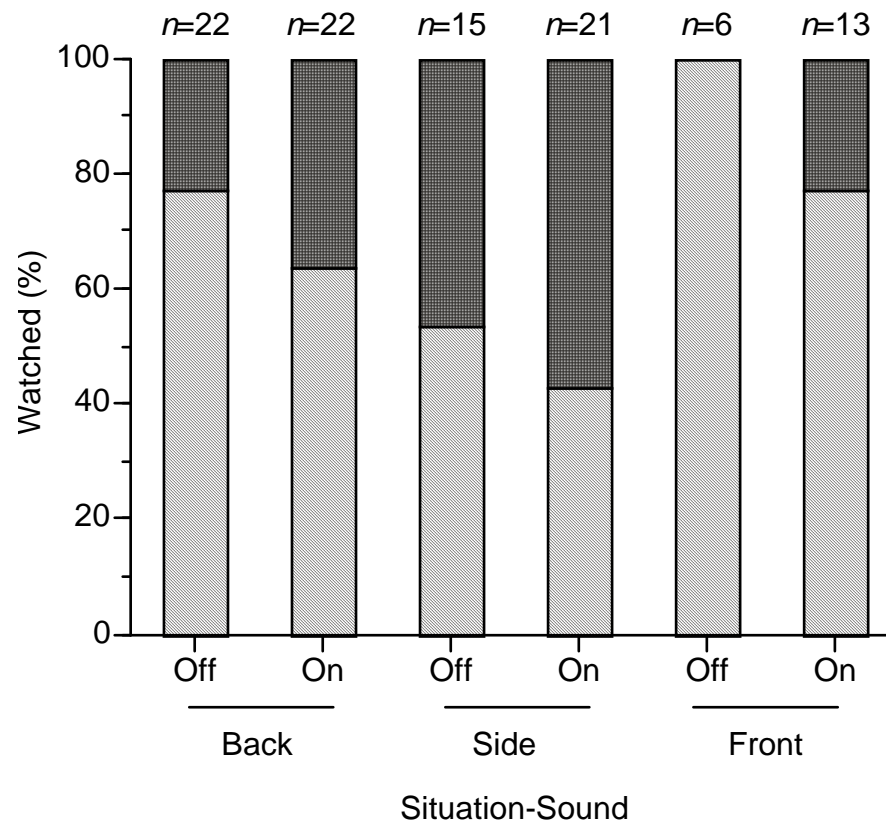
Observation 3: Making use of the GAD truck in Amsterdam

The observation was conducted in Amsterdam. Nassaukade

The traffic situation is a crossing, with traffic lights. The truck takes a right turn. This is repeated 20 times.

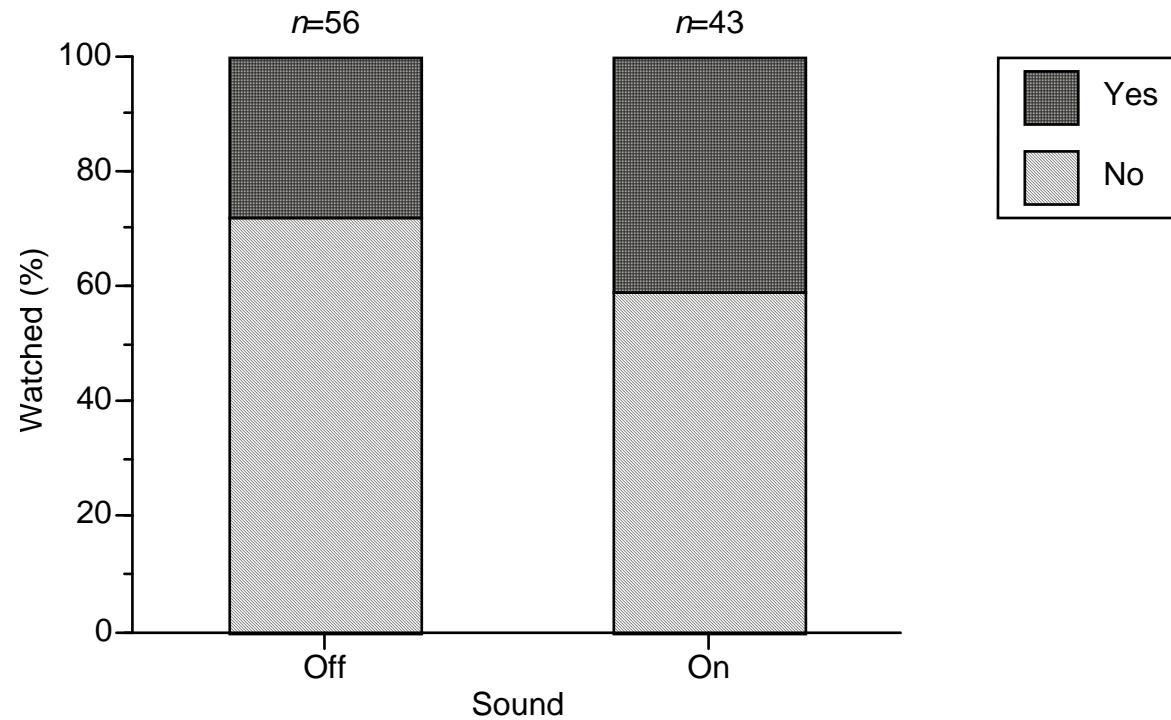
Half of the times the Lisa-Alert-System is switched off

Amsterdam: Nassaukade-Kinkerstraat

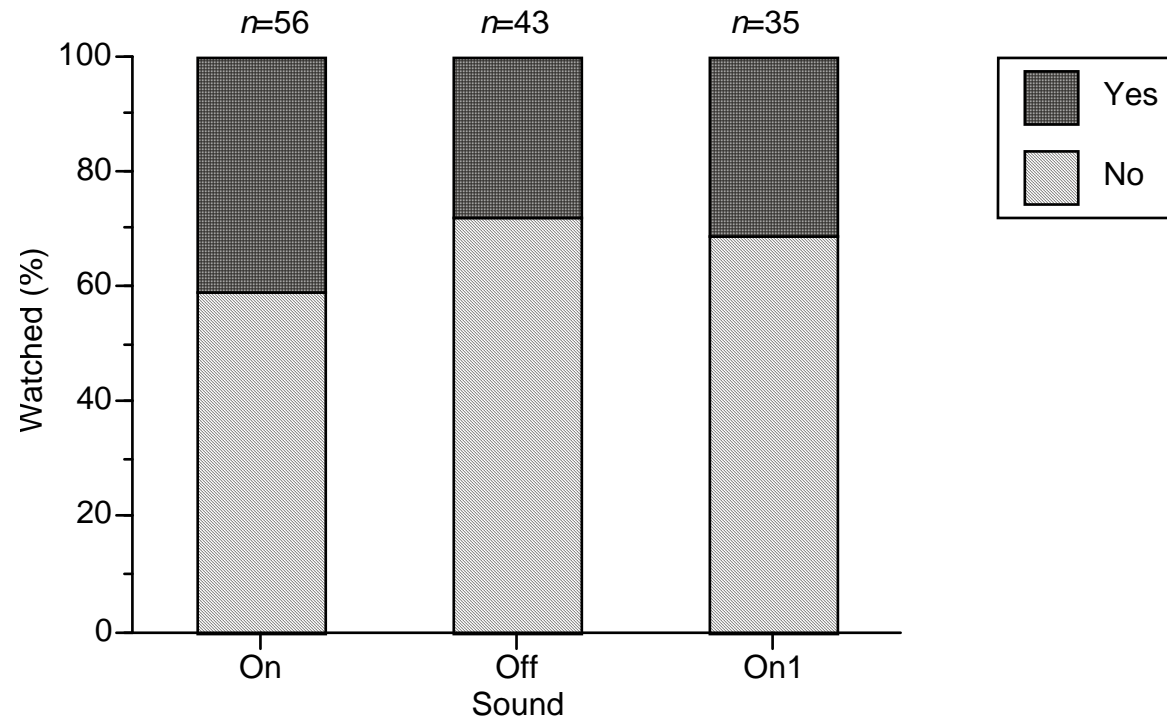


Situation: $\chi^2(2)=10.73, p<.005$
Sound: $\chi^2(1)=3.79, p=.05$

Amsterdam: Nassaukade-Kinkerstraat



Amsterdam: Observation 1 and 2



Interview Users

J. Den Breejen

- Uses system for 6 years
- No accidents since then
- Drivers are pleased and report system is helpful
- Sound became less loud over the years
- No complaints reported concerning noise pollution
- Police satisfied



Interview Users

Evert in de Betouw

- Uses system for 7 years
- No accidents since then (before: 1 accident every 2 years)
- Drivers are pleased and report system is helpful

Conclusions

- Lisa-2 alert increases the attention of the cyclist and the driver
- Shift of responsibility not completely to the cyclist
- Responsibility shift already present in the blind spot campaign of Ministerie van Verkeer en Waterstaat
- People need to attribute meaning to the signal
 - Information campaign
 - Bussum system was used over longer period, and cyclists appear to look more to the truck than in Amsterdam
- Concerning irritation sound. A follow-up investigation can be suggested with several trucks using the system. But so far no complaints.
- Long term adaptation of drivers. J den Breejen and E. in de Betouw: no more accidents in six years after starting to use the system.

QuickTime™ and a
H.264 decompressor
are needed to see this picture.