

## **The dynamic signalization of calamity routes – a driving simulator study**

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# 1. Background

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- Calamities (e.g. accidents) in the vicinity of freeway interchanges can block some branches of the interchange
  - Inform drivers in time
  - Digital displays to warn & guide them
- Calamity route = rerouting drivers to the secondary road network

# 1. Background

- Case study Belgian freeway interchange (>100,000 vehicles / day)



# 1. Background

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- Focus on tactical information (i.e. max. 5km from accident)
- Sequential information about the calamity and rerouting advice
  1. What is the problem?
  2. Where is the problem located?
  3. Who is the intended audience (i.e. maybe not all the branches are blocked?)
  4. What is the effect of the problem?
  5. What should road users do?



Detection

Readability

Understanding

Behavior

## 2. Objectives

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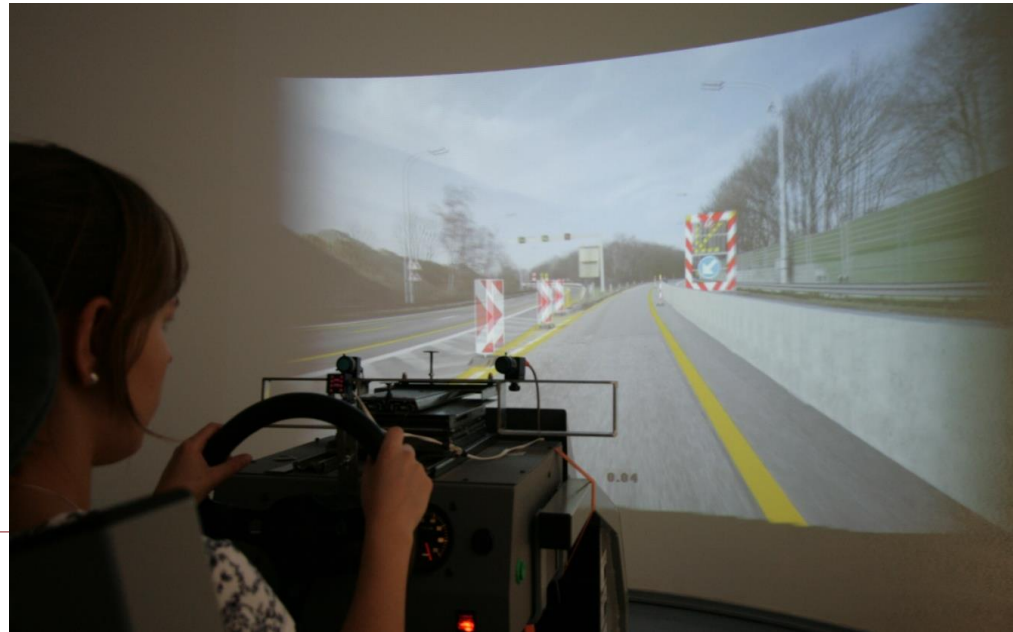
### **“Effectiveness of sequential message strategy”**

- Do road users process the displayed information?
- Do road users follow the rerouting instructions?

# 3. Methodology

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- 16 participants
- Driving simulator
  - Real-life full HD video
    - 3D virtual traffic signs digitally integrated
  - Fixed-base mock-up
  - Speed up and slow down the video by means of the accelerator and brake pedal
  - faceLAB eye tracking system



# 3. Methodology

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## Scenario design

- Sequenced messaging
  - STEP 1: Digital Variable Message Sign (on freeway)
    - Message unit 1: what has happened (→ pictogram)?
    - Message unit 2: which exit to be taken by whom (→ text)?
  - STEP 2: Static (metal) sign (at exit entry)
    - Message unit 3: which deviation to be followed by whom (→ destinations and corresponding letters)?
  - STEP 3: Static (metal) sign (at exit end)
    - Message unit 4: which direction to be taken by whom (→ letters)?

# 3. Methodology





# 3. Methodology

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## 5 scenarios

1. From Aachen to Leuven (→ direction Brussels), calamity displayed on an RVMS (i.e. cantilever)
2. From Aachen to Liège (→ direction Liège), calamity displayed on an RVMS
3. From Aachen to Antwerp (→ direction Antwerp), calamity displayed on an RVMS
4. From Brussels to Aachen (→ direction Aachen), calamity displayed on a VMS (i.e. gantry)
5. From Brussels to Antwerp (→ direction Antwerp), calamity displayed on a VMS.

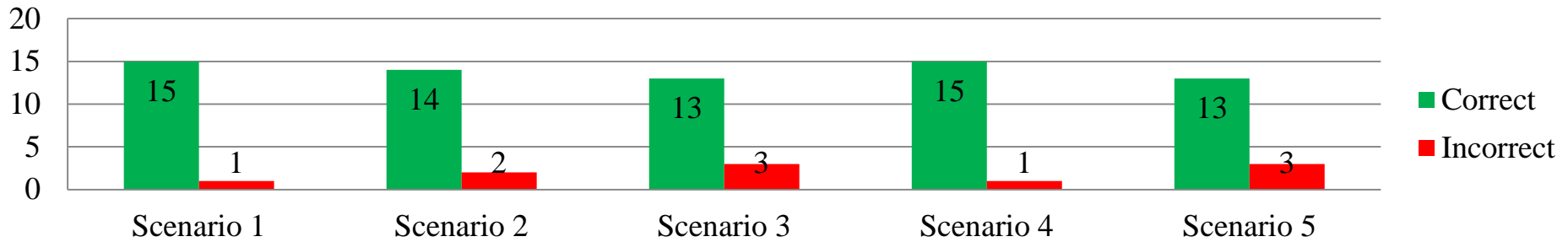
# 3. Methodology

## RVMS (cantilever) vs. VMS (gantry)

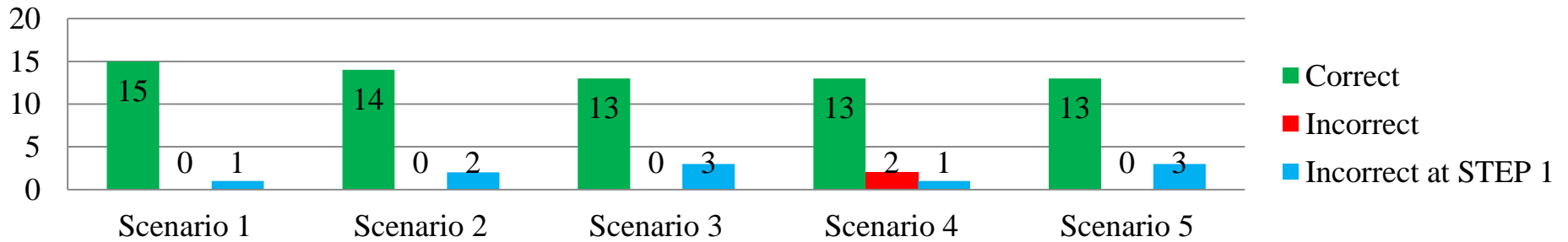


# 4. Results – route choice

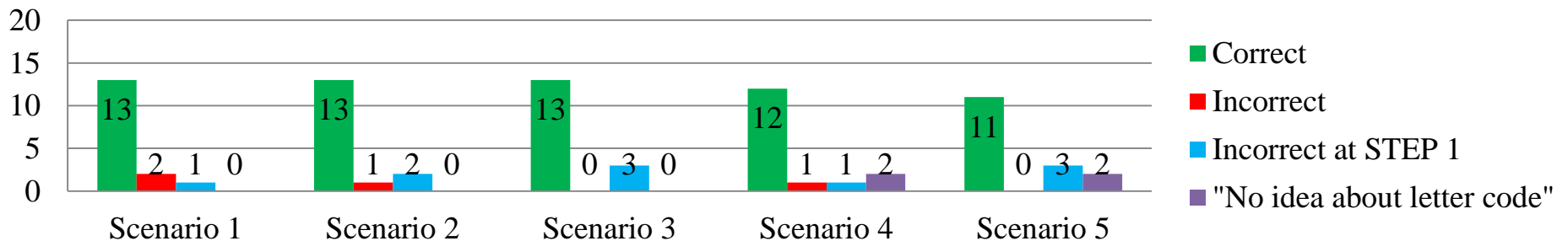
## Route Choice - STEP 1 ((R)VMS)



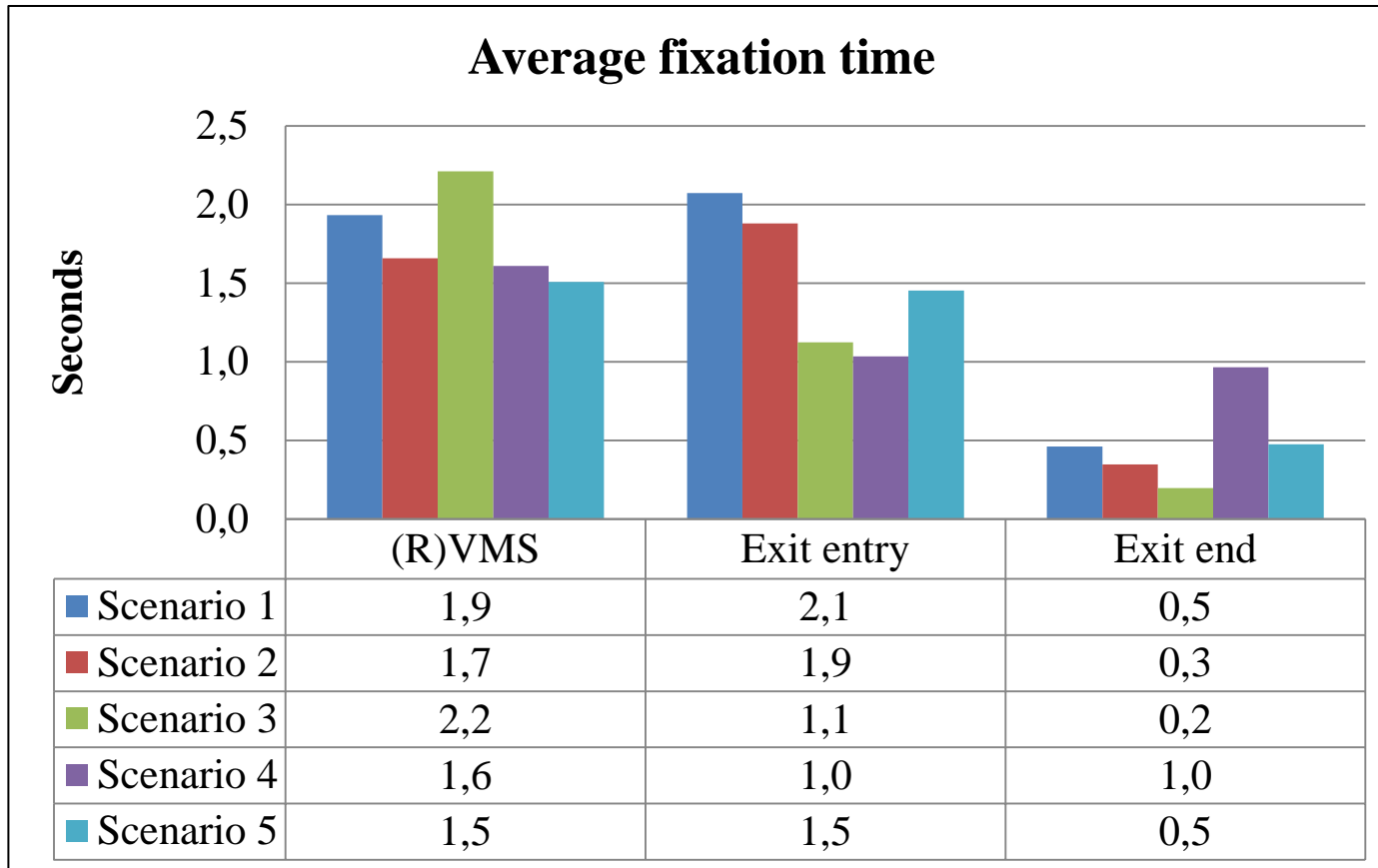
## Route Choice - STEP 2 (at exit entry)



## Route Choice - STEP 3 (at exit end)



# 4. Results – looking behavior



# 5. Conclusions

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## 6 types of drivers

### Group 1 (= largest group!)

1. Fixation on time, read and understood the message correctly, made the correct route choice.

### Group 2

2. Fixation too late, incomplete reading and understanding, wrong route choice.
3. Fixation on time, inattentive reading, wrong route choice.
4. Fixation on time, read and understood the message correctly, wrong route choice.
5. No fixation, wrong route choice.

### Group 3

6. Fixation on time, read and understood the message correctly, but consciously ignored the message (i.e. wrong route choice).

# 5. Conclusions

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## Effectiveness of RVMS and VMS

- Objective → RVMS generate a slightly (= non-significant) longer average fixation time compared to VMS.
- Subjective → Participants think that RVMS are more difficult to detect (and subsequently to read!) compared to VMS.

# 5. Conclusions

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- In general, the sequenced message strategy has been effective in rerouting the drivers
- Drivers noticed the messages and obeyed it correctly

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## STEP 1: Digital Variable Message Sign (on freeway)

- Message unit 1: what has happened?
- Message unit 2: which exit to be taken by whom?

## STEP 2: Static (metal) sign (at exit entry)

- Message unit 3: which deviation to be followed by whom?

## STEP 3: Static (metal) sign (at exit end)

- Message unit 4: which direction to be taken by whom?



**Thank you for your attention!**

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