56TH CIECA CONGRESS
DUBAI 2024

RTA

# Analysis of risk factors in motorcycle riding and distribution of attention using Eye Tracking, Interview, and Video

**Part 1 and Part 2**

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NORD University

# Background and motivation

## 01

22,5% (2022)

Negative accident development

- Motorcycle accidents make up a large percentage of all accidents
- Within the system limits
- Age

## 02

Education

We train and educate all Norwegian motorcycle teachers

- Our own education needs to be research-based
- We play an important role in working with the authorities to take targeted measures against motorcycle accidents

# Test phase

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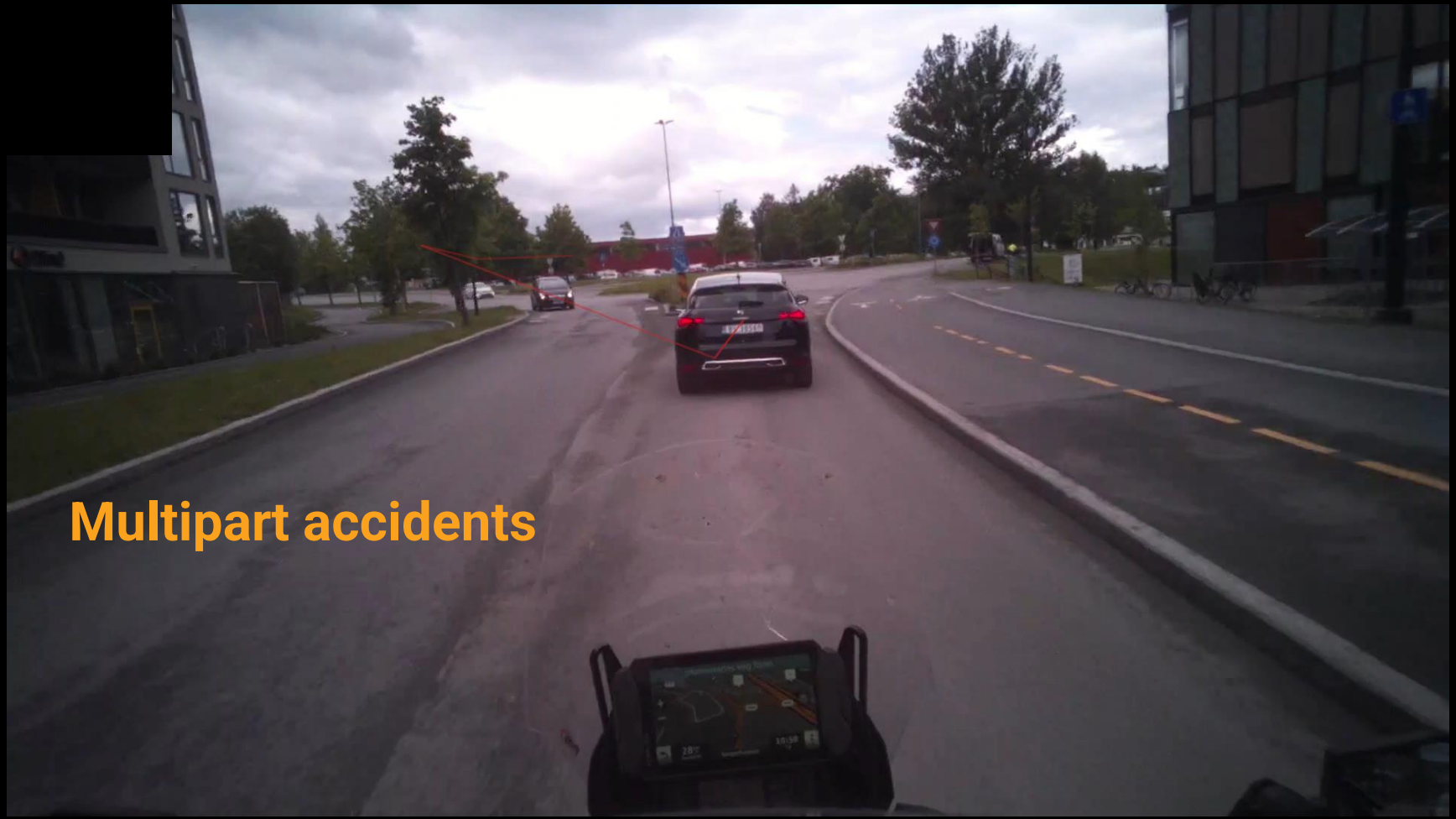
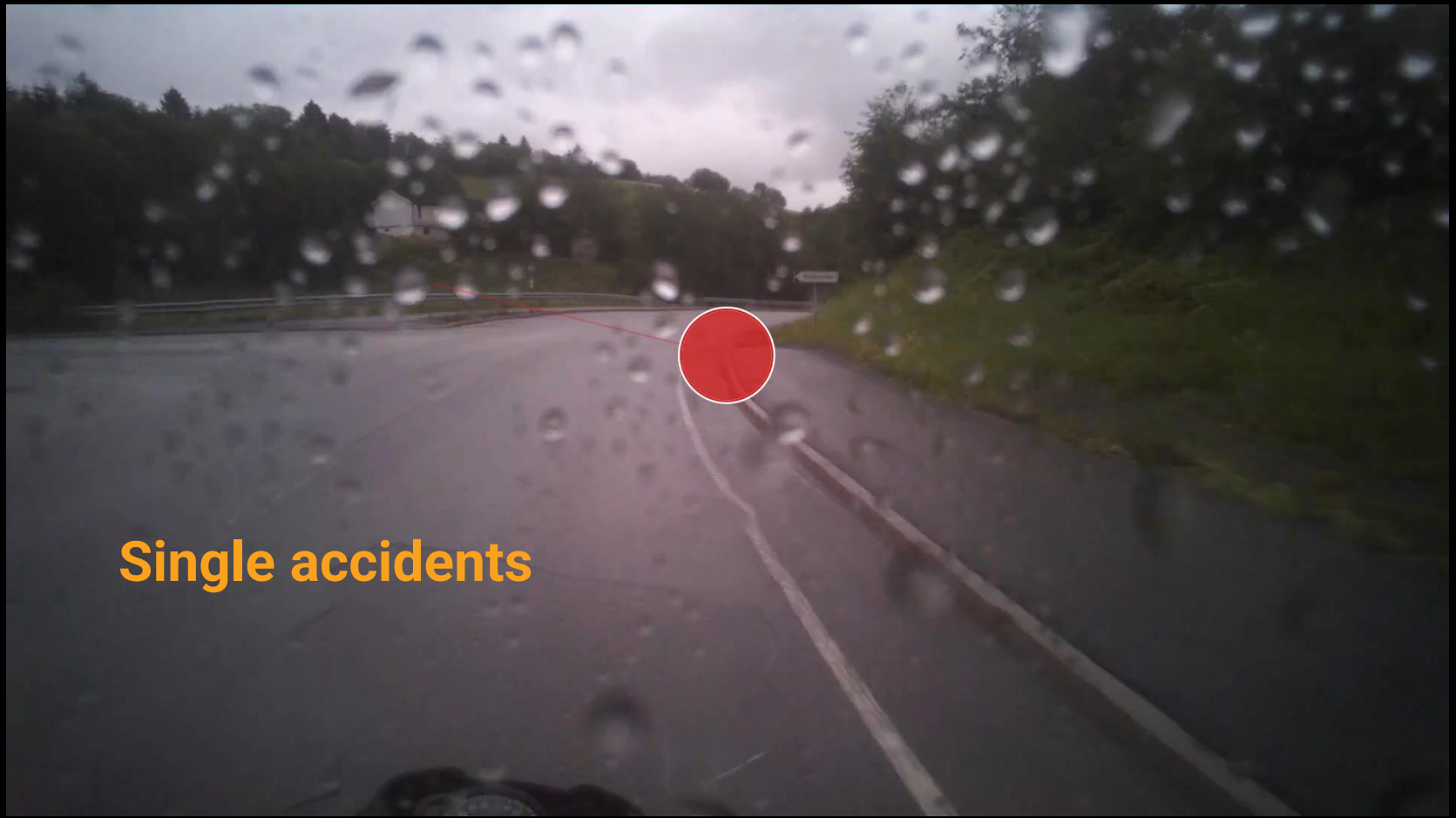
Part ❶ - Preliminary study

# Participants

| Group 1 | Sex | Age | Segment |
|---|---|---|---|
| 001 | M | 55-64 | Touring |
| 002 | M | 45-54 | Touring |
| 003 | W | 45-54 | Touring |
| 004 | M | 55-64 | Touring |
| 005 | W | 45-54 | Touring |
| Group 2 | | | |
| 01 | M | 55-64 | Touring |
| 02 | M | 65-74 | Touring |
| 03 | M | 55-64 | Touring |
| 04 | M | 55-64 | Touring |

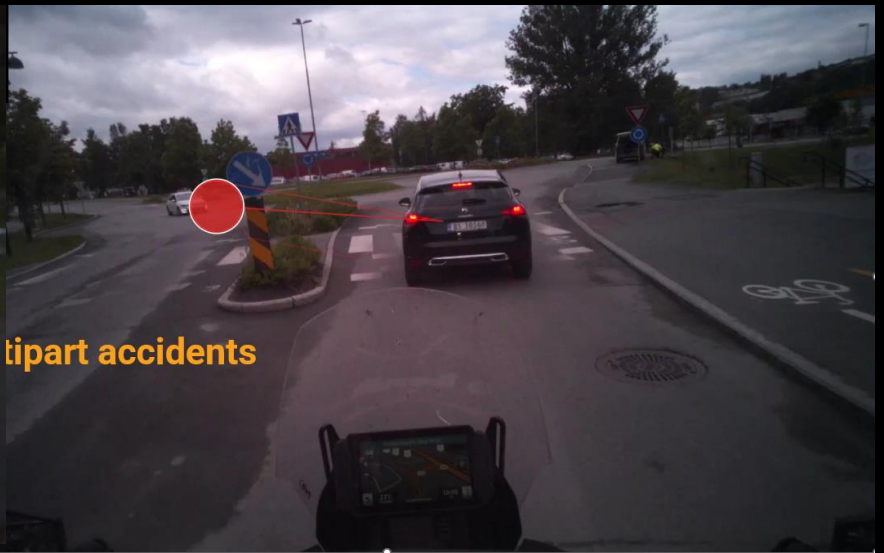

Multipart accidents




SPV – Video (003G2 SPV 98%)

# Understand information gathering and tactical choices

Qualitative analysis by professional experience
Strategic and tactical choices



# Results

**Limitations**

- Number of participants
- Group 1 riders - different experience

| | |
|---|---|
| Preparedness<br>The motorcyclist´s ability to plan and prevent towards intersections | The motorcyclist´s assessments and ability to predict conflicts |
| Distribution of attention on a road with poor surface | Positioning towards and through curves |

**Part 1 - Preliminary study**

# Part ❷

**The preliminary study ❶ formed the basis for a continuation:**
**❷ Motorcycle riders attention and choice of action for safe riding**

- **Multi-party accidents**

Distribution of attention towards and through intersections

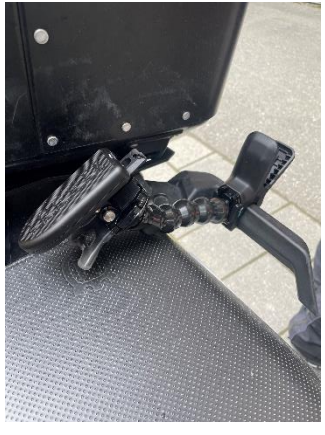
- **Single accidents**

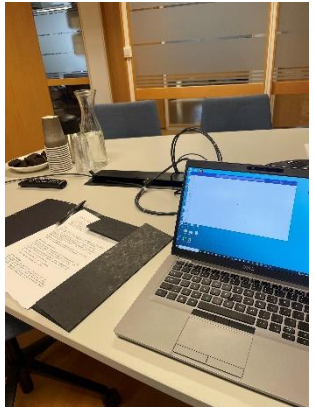
Tactical choices of speed and position into and through curves?

Fixations points and fixation times on curvy roads

## In autumn2023, we tested 60 riders divided into three different groups :

1. Riders with less than three years' riding license who use the motorcycle for leisure and commuting riding
2. Riders with more than three years' riding experience and who regularly use the motorcycle for leisure and commuting riding
3. Riders with longer professional experience on motorcycles such as the police, riding test examiners in the Norwegian Road Administration, riding instructors and track riders

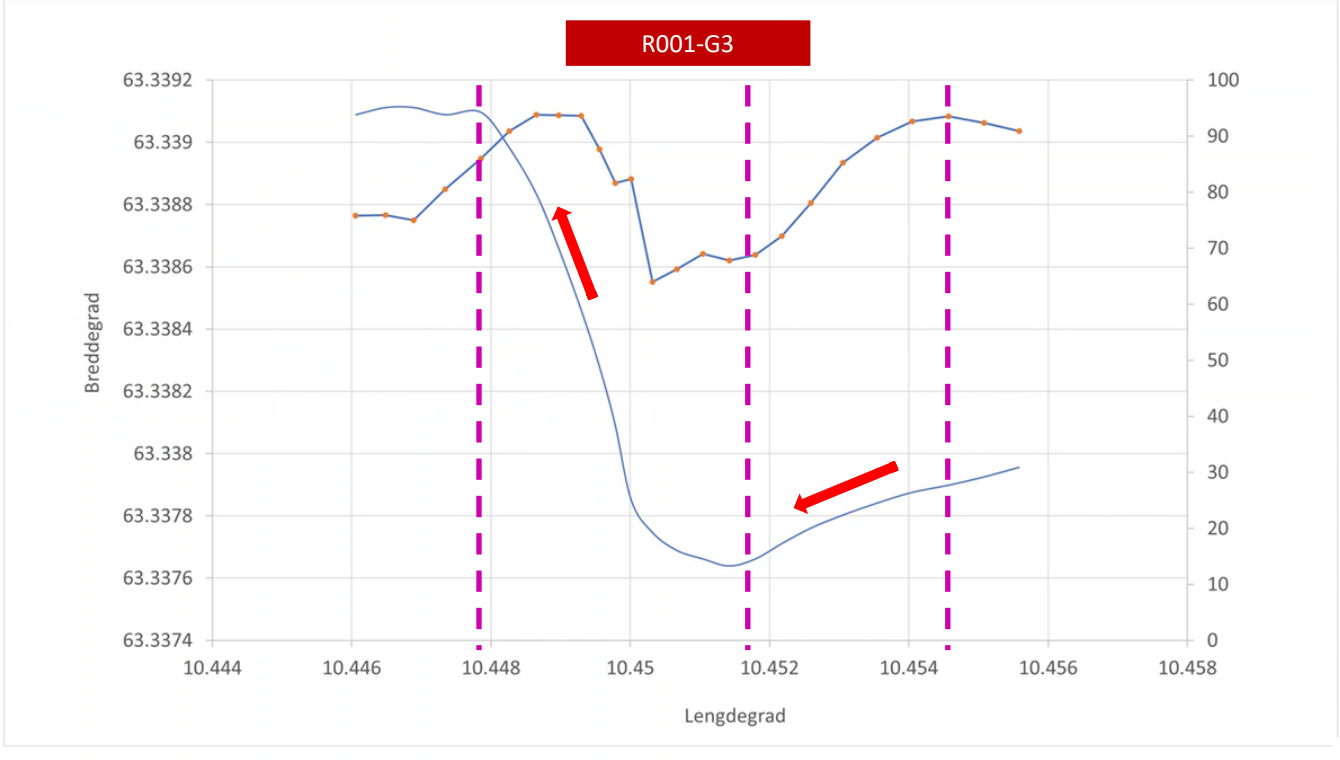


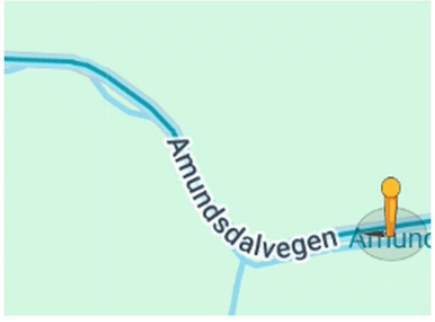


# AMUNDDALEN – Motorcycle R/L Curve

PL1 before - PL2 turn-in right PL3 through right curve PL4 turn out right turn PL5 turn-in left

# Speed profile




Direction

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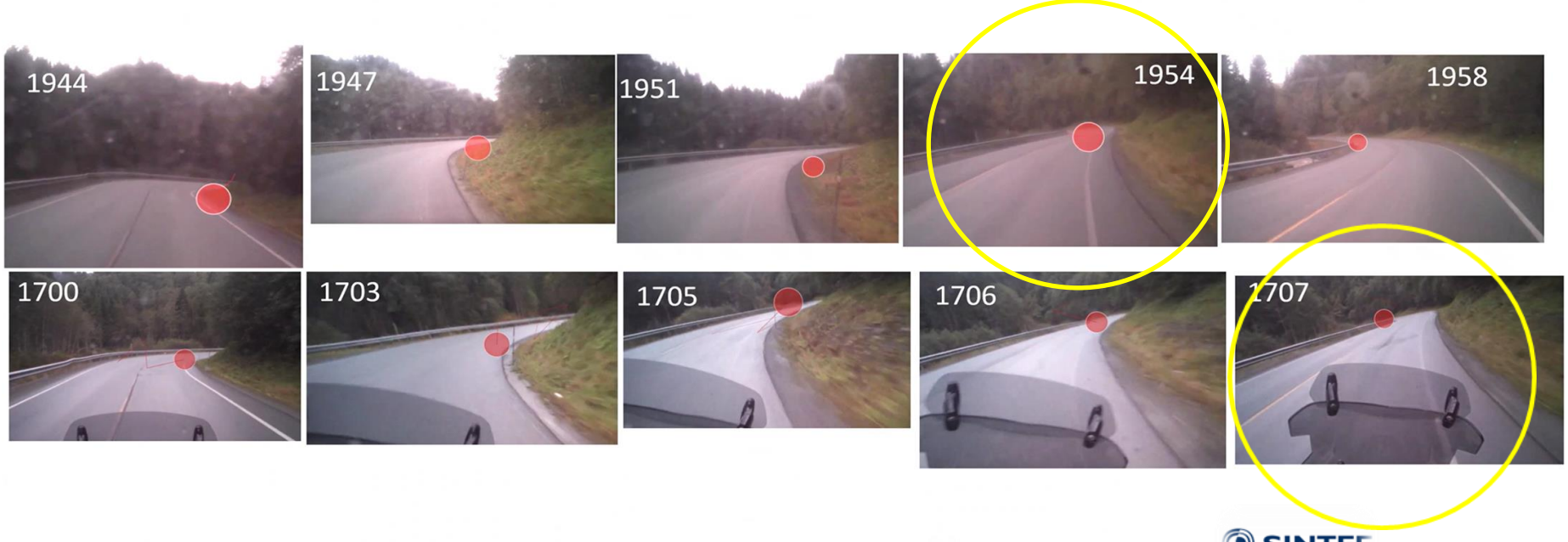
# Prediction and remapping



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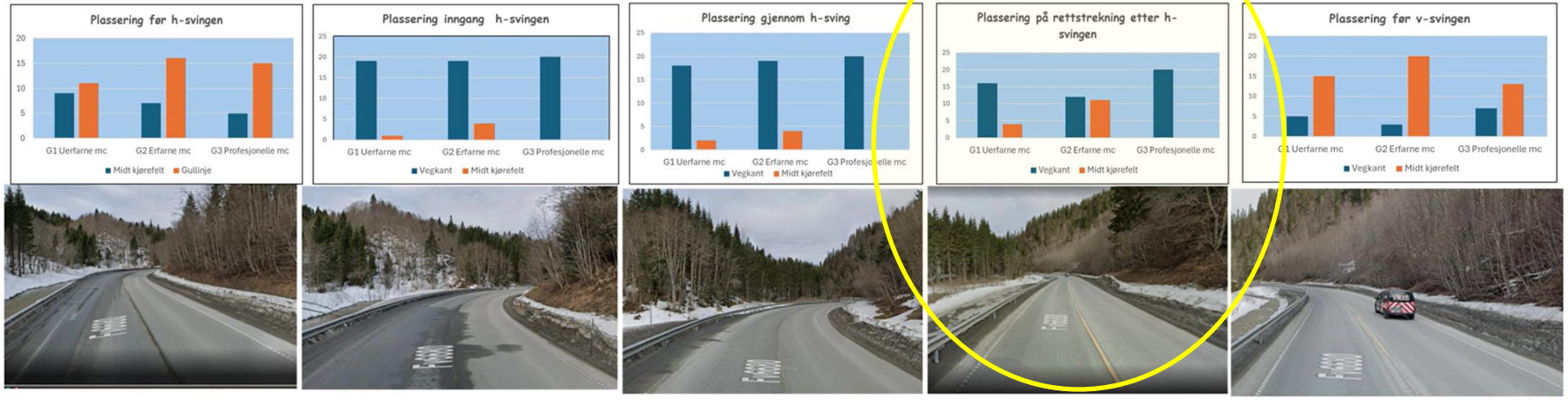
# Positioning in different locations before a left curve




**Blue** = Right side of the lane

**Orange** = Towards the center of the lane

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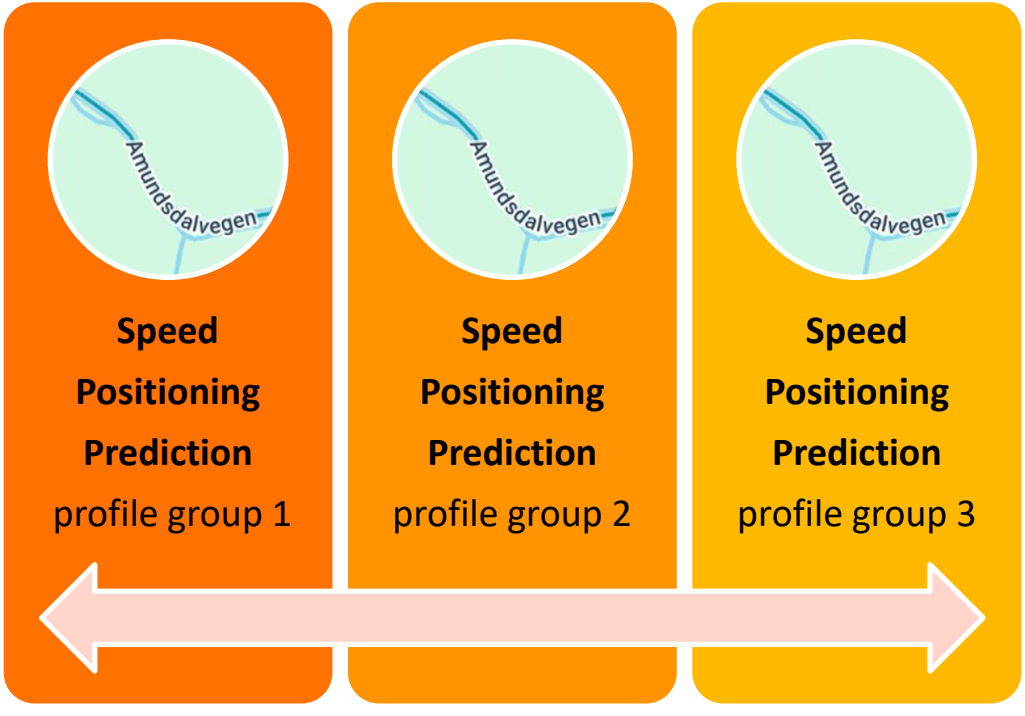
# Profile

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# Publication

*Research report*
*Nord University*

FoU-RAPPORT

Sikker kjøring på motorsykkel
Analyse av risikofaktorer ved motorsykkelkjøring og oppmerksomhets-fordeling ved bruk av eye-tracking, intervju og video

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Nord universitet
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NORD universitet

www.nord.no

*ESREL*
*Southampton (UK)*

Analysis of Risk Factors in Motorcycle Riding and Distribution of Attention Using Eye Tracking, Interview, and Video—Preliminary Study

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Nord University and SINTEF Community, in collaboration with Trygg Trafikk, have carried out a preliminary research study examining the motorcycle accident risk factors and the possible causal relationships of single-motorcycle accidents and multiple-vehicle collisions. The objective was to investigate the distribution of motorcyclists' attention using eye-tracking, interview, and video analysis. The main research question of the study was: What are the most critical factors for riding a motorcycle safely? Nine motorcyclists with different knowledge and experience levels in riding a motorcycle participated in the study. The Tobii eye-tracking system was used to record and reveal the ability of motorcyclists to orient themselves when riding the same route with roundabouts, intersections, and roads with different speed limits. Their riding tours were recorded, and the eye fixation points, fixation point durations, and eye movements were analyzed. All the motorcyclists were interviewed after riding the specific route to understand individual differences in their subjective experiences: self-reported behavior related to planning, attention seeking, speed selection, and road positioning. The study provides findings that strengthen the knowledge base for those who plan and carry out the education of motorcycle instructors and motorcycle riders. The findings will be of high interest for road safety decision makers and for launching new awareness and information campaigns.

*Keywords: Motorcycle, Eye tracking, Accidents, Cognitive maps, Vision Zero strategy*

**1. Introduction**

In 2022, fatal motorcycle accidents accounted for over 20% of all traffic fatalities in Norway (SVV 2022). A total of 21 motorcyclists lost their lives, the highest number since 2016 (Statistics Norway, 2023). Approximately 52% of these accidents are single-motorcycle accidents. Among those who died in motorcycle accidents in the 2015–2022 period, the 45–54 age group and men are overrepresented (SSB). There is a need to understand why the number of motorcycle accidents are increasing in Norway. Safety for motorcyclists is discussed both in the National Transport Plan (NTP, 2021) and in the Norwegian Public Road Administration's (NPRA) Action Plan for Traffic Safety for light and heavy motorcycles and mopeds (NPRA, 2022).

The Norwegian Vision Zero strategy (NPRA, 2021) lays down an ambition to reduce fatalities and serious injuries in road traffic to a maximum of 350 by 2030, of which a maximum of 50 is fatalities. No one should die in road traffic accidents in 2050. To achieve this goal, important measures must be taken to reduce the number of motorcycle accidents.

Previous research showed that individual driving characteristics and driving behavior are the two main risk factors contributing to motorcycle accidents (Lin & Kraus, 2009; Sexton, 2004). In a review of 220 publications on

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# Thank you for your attention

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## Research
New knowledge about behavior and competence

## Education
Ensuring the quality of our own education

## Dissemination/Communications
Support decisions makers. Propose training measures within road safety