

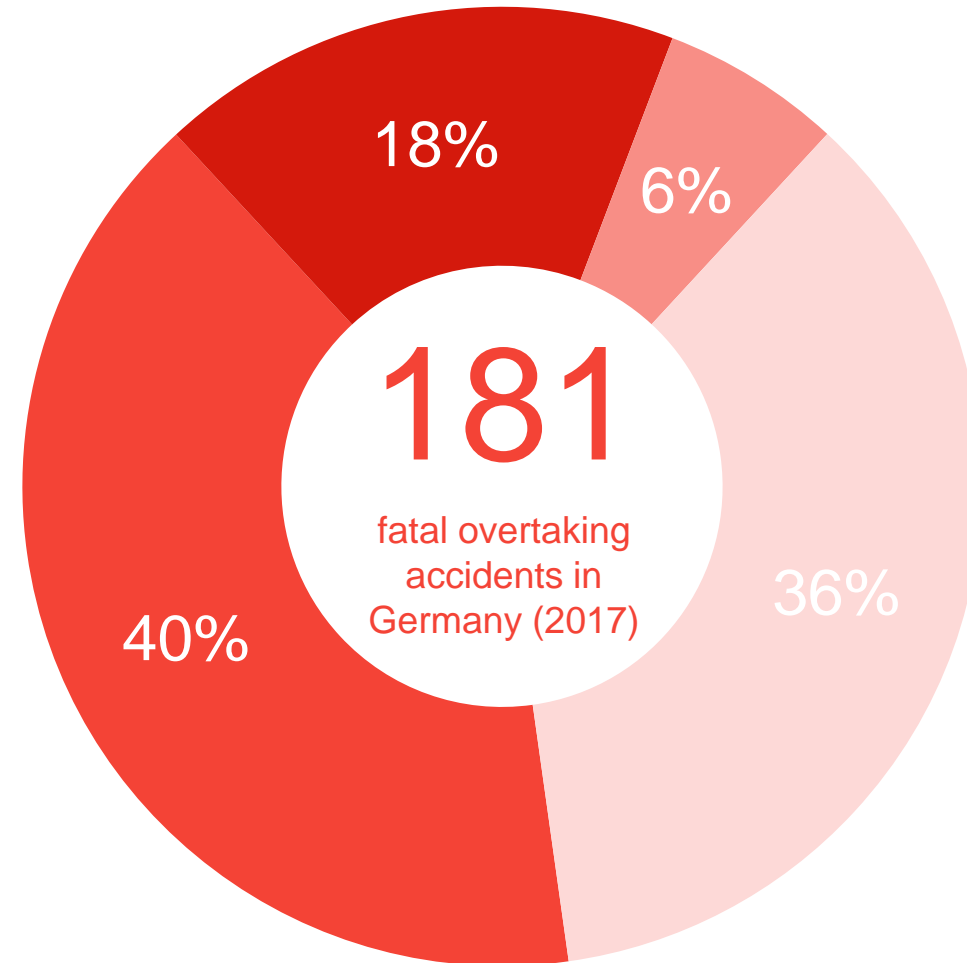
Relationships between Oncoming Traffic Intensity, Subjective Predictions about Oncoming Traffic, and Intentions to Overtake

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Why

do drivers overtake in these potentially risky situations?



■ Overtaking despite oncoming traffic

■ Overtaking despite unclear traffic situation

■ Overtaking despite poor sight

■ Others

OVERTAKING

What we already know

Roads with generous lateral space and lines
= better sight and swerve-possibilities
= increase of overtaking maneuvers

High traffic volume in the opposite direction
= fewer suitable overtaking gaps
= fewer overtaking maneuvers

High volume of traffic in the direction of travel
+ temporarily reduced speed
= more overtaking maneuvers

Slow lead vehicle + reduced speed
= increase of overtaking desire

No overtaking option + overtaking pressure
= critical judgements and decisions

OVERTAKING

What we didn't know

Do drivers collect data about the intensity of oncoming traffic?

Are they able to develop adequate predictions about oncoming traffic
for a forthcoming overtaking decision?

THEORETICAL APPROACH

Predictive Framework Model

ASSUMPTION

A hierarchical generative model predicts sensory input in advance

BASE

Exposure and statistical regularities captured over time

AIM

Accurate predictions that produce minimal discrepancy

→ continuous comparison of predictions with actual sensory input & processing discrepancies

PREDICTION ERROR

Error signal passed through the system for troubleshooting purposes → Update

UNCERTAINTY

Predictions are made with a certain accuracy: high precision = low subjective uncertainty

BASIS

Hypotheses

ASSUMPTIONS

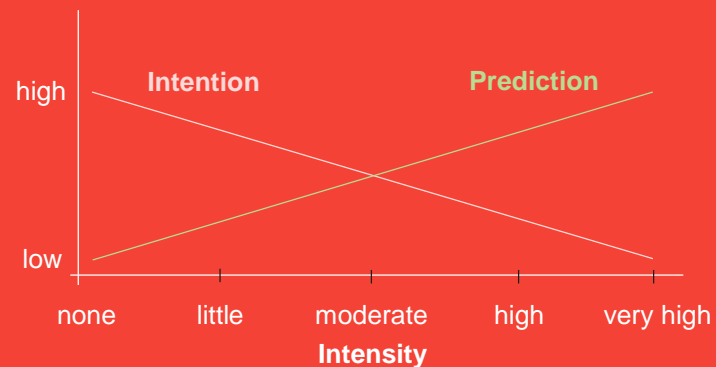
- Drivers make decisions based on predictions of incoming sensory input
- Predictions are based on previous exposure and learned regularities

KEY QUESTION

Do predictions of oncoming traffic influence risky overtaking decisions in rural road environments?

01

The intention to overtake differs between all experimental conditions of oncoming traffic intensity.



02

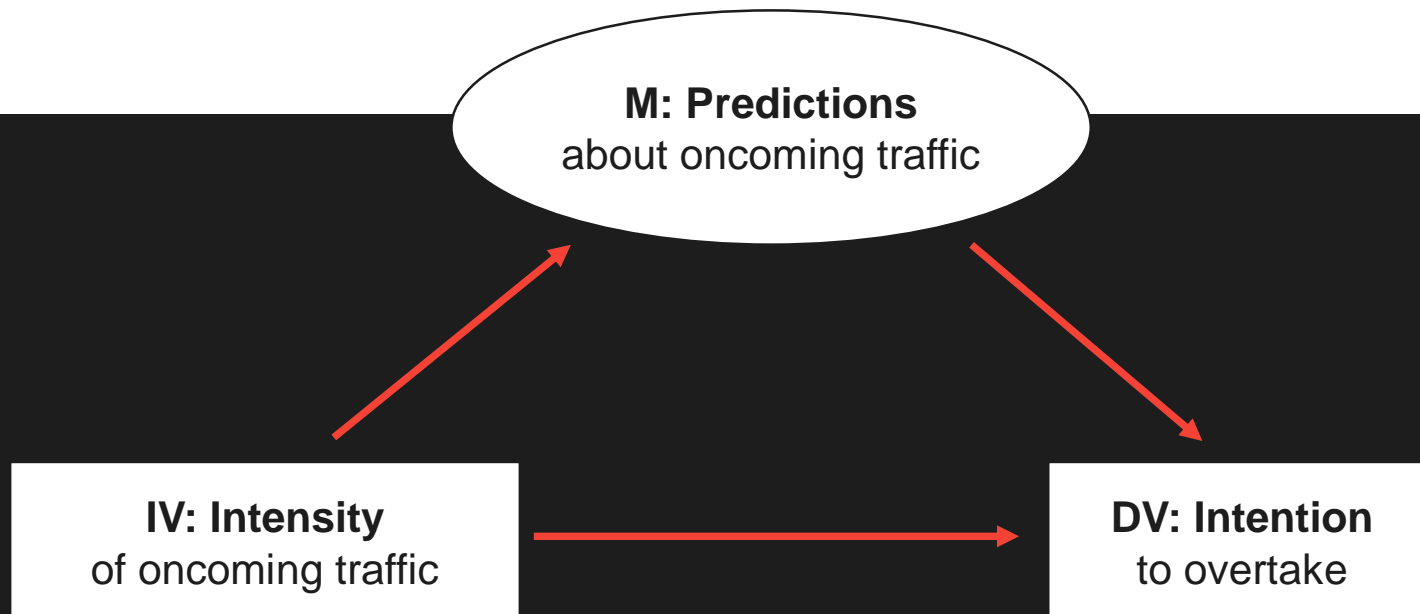
The prediction about oncoming traffic differs between all conditions of oncoming traffic intensity.

03

The prediction about oncoming traffic mediates the effect from the intensity of oncoming traffic on the intention to overtake.

STUDY

Design



CONDITIONS

none (0/min) – little (5/min) – moderate (10/min) – high (15/min) – very high (20/min)

Subjective certainty

Overtaking pressure

Speed Data

Overtaking maneuvers

Sample

- 36 students (69.4 % female)
- Age: 18 - 28 years
(M = 21.61, SD = 2.50)
- Driving license possession:
1 - 11 years (M = 4.06, SD = 2.57)

STUDY

Procedure

Questionnaire 1

Familiarization

Briefing

5x test drive (approx. 4 min.)

Questionnaire 2



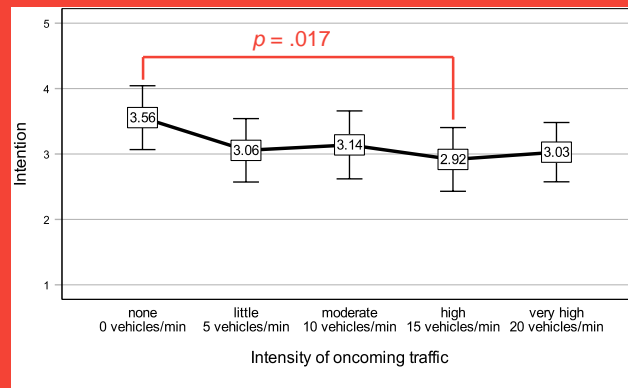
Would you start an overtaking maneuver?

RESULTS

Evaluation of hypotheses

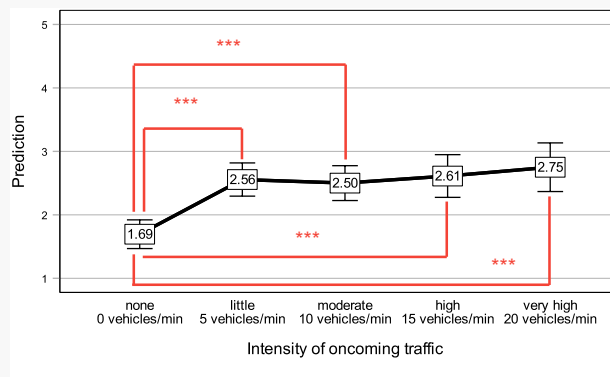
01

The intention to overtake differs between all experimental conditions of oncoming traffic intensity.



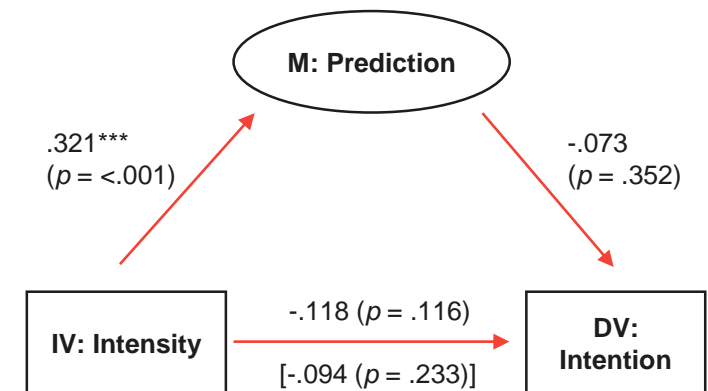
02

The prediction about oncoming traffic differs between all conditions of oncoming traffic intensity.



03

The prediction about oncoming traffic mediates the effect from the intensity of oncoming traffic on the intention to overtake.



DISCUSSION & INTERPRETATION

Sum up

- Drivers showed a higher overtaking intention when not exposed to oncoming traffic at all
- Overtaking intention always ranged in the upper half of the scale regardless of the amount of oncoming traffic
- Prediction ratings ranged only between low and moderate
- Traffic intensity proved to be a significant indicator for the predicted traffic level
- Predictions did not influence the coherence between oncoming traffic and the decision to overtake
- Directional tendencies corresponding to the assumptions could be identified
- A rather high need for overtaking was reported in all conditions

DISCUSSION & INTERPRETATION

Thoughts

Operationalization

Was the intensity of oncoming traffic not sufficiently distinguishable?

Do rivers only form a dichotomous rudimentary image of oncoming traffic based on the all-or-nothing principle?

Did the increased need to overtake create too much overtaking pressure?

Scenarios

Reduced speed of oncoming traffic: 15 km/h
→ Was this taken into account when assessing overtaking attention?

No oncoming traffic immediately before the end of the scenario: did a prediction error occur?



Conclusion

RESULT

Positive overtaking intention was shown almost independent of the intensity of oncoming traffic.

NOW WHAT?

- Overtaking procedures should be increasingly addressed and practiced in driving training:
 - Drawing attention to oncoming traffic & monitor
 - Derive a differentiated representation of the oncoming traffic situation
 - Maintain and use a concrete internal statistic, rather relying on all-or-nothing judgments

Thank you
for your
attention!



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