INTRODUCTION

This study aims at refining a cognitive model for the takeover in highly automated driving. It is able to interact with different traffic scenarios and represent human cognition to build up situation awareness [1]. Model predictions are compared to empirical data. The aim is to answer the following questions:

- Is the cognitive model able to interact with environments of different objective complexity?
- Do model predictions and empirical data significantly correlate?

HOW

Productions of the cognitive model in ACT-R

WHAT

- Development of a cognitive model using ACT-R [3]
- Depiction of the impact of objective complexity on the takeover from a non-driving related task until an action execution in highly automated driving
- Prediction of takeover patterns in different traffic situations to build up situation awareness

Results:

Compared to time courses in empirical data of a real traffic study ($N = 14$), model predictions show significant (bivariate pearson) correlations to human data ($r(2) = .95, p = .05$).

With an increase of the amount of objects in the traffic environment, the reaction time to execute a maneuver increases.

The model is run through 17 scenarios, varying in complexity (0 - 5 vehicles).

The outcome shows a significant rise in time until the action decision was made with a $\beta$-coefficient of 0.04 ($\beta = .04, p < .05$).

OUTLOOK

- Include differentiations between different drivers
- Include more objects (apart from relevant vehicles) that play an important role during the takeover

CONCLUSION

The model is able to:

- predict global cognitive patterns,
- adapt to different driving environments and
- perform cognitive patterns accordingly