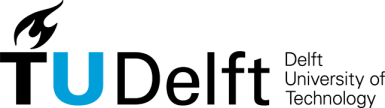
Truck Merging Support 

Data Collection: 20 May 2017

Semi-Structured Interview:

Literature:

Kassner, A., & Vollrath, M., 2006. How to assist merging onto the freeway*. Proceedings of the IEEE ITSC*, 121-126.

Kassner A., B. M. W. L. (2010). A Hierarchical Task Analysis of merging onto a freeway. - Comparison of driver’s and driver model’s task representation. In A. L. C. R. P.c. Cacciabue M. Hjämdahl (Ed.), Human Modelling in Assisted Transportation (pp. 291–298). Springer.

Baumann, M., Steenken, R., Kassner, A., Weber, L., & Lüdtke, A., 2011 Effects of situational characteristics on drivers' merging into freeway traffic. In C. P Cacciabue (Ed.), Human Modelling in Assisted Transportation. Milan, Italy (pp. 343–351). Springer.

Salmon P., Jenkins J., Stanton N. & Walker G. (2010). Hierarchical task analysis vs. cognitive work analysis: comparison of theory, methodology and contribution to system design, *Theoretical Issues in Ergonomics Science*, *11:6*, 504-531,

Kondyli, A. (2009). Driver Behavior At Freeway-Ramp Merging Areas : Focus Group Findings. *Transportation Research Record*, (2124), 1–22. https://doi.org/10.3141/2124-15

Objectives:

1. Insights into the mental representation of the merging process, memory elements and comprehension;
2. Insights into merging decision process;
3. Insights into necessary actions to fulfil the task
4. Insights into the perception of information while merging;
5. Insights into the use of information sources (mirror use, alternation between windscreen and mirrors);
6. Insights into the expectation and anticipation of other traffic’s behaviour;
7. Already established (coping) strategies for lack of information;
8. Heavy goods vehicle specific difficulties;
9. Insights into accidents and dangerous situations;
10. Attitudes towards assistance systems and especially automated driving;
11. Already established (coping) strategies for lack of information;

Sample size:  *N* = 15

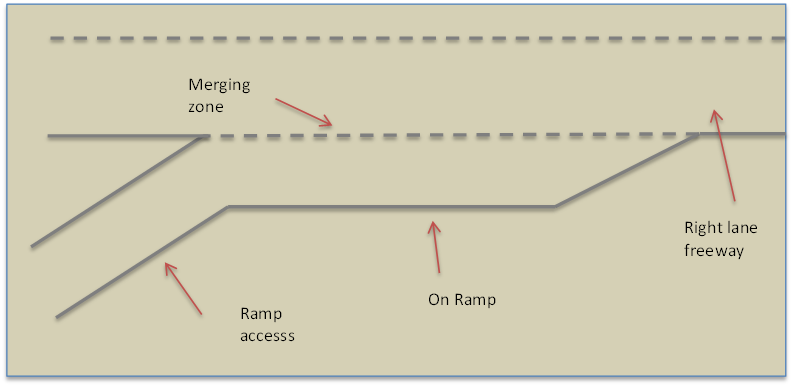
Protocol: Voice recordings

Instruction interviewer:

The interview guide is designed to help the interviewer satisficing the objectives. Every objective is to be addressed. However, sub-questions serve as help to capture holistically all aspects of interest. The questions are not meant to be used literally and in its sequence within the objective. The sequence of objectives, in contrast, is fixed to avoid sequential effects of interviewing.

Questions Part 1: Merging task

1. Describe how you merge normally on the freeways, begin with specifying your action at the start of the ramp:
2. Merging procedure
   1. Specify main actions to fulfil the merging task (write down on sheet)
   2. Specify sub actions of the main goals (what needs to be achieved)
   3. Describe sub action: See questions to be answered
      1. What needs to be accomplished?
      2. What actions have to be performed to achieve the goal/ action?
      3. What kind of information is relevant and needs to be perceived?
      4. What kind of problems (also dangerous situations) can occur within each action?



1. How dangerous do feel is merging compared to other truck manoeuvres
2. If you could only have one type of lateral mirror at your truck, which mirror would you retain class IV or Class II

Main Action: Global traffic analysis at ramp access (i):

Questions to be answered during the description (red line) (ii):

* When do you start looking at the adjacent lane on the freeway ?
* Do you use the mirrors already at the ramp access?
* If so how do you use the mirrors (Specifying which mirror at what time)?
* What are you trying to figure out, what do you look at (What information is relevant)?
* Why do you look at this already in the curvature?
* What kind of trouble can occur already on the ramp?
* Is there a difference on the ramp when you have one or two trailers? (Please describe)
* Did any dangerous situation occur on the ramp? (Please describe)
* What might have prevented this situation?
* How do you face the problem? (coping strategy)
* What kind of assistance would have been helpful?
* Under which conditions are you tensed, already at the ramp access/ start of the ramp? (move to general)

Main Action: On ramp traffic analysis and gap selection/ adaption to gap (i):

Red line (ii + iii):

* How do you observe traffic while you are on the ramp?
  + Describe the difficulties of the observation?
* What is the most important Information at the beginning of the ramp?
* Please describe how you accelerate!
* Does traffic density affects the way you are observing traffic?
* Why does it affect you?
* How do you cope with the higher density
* Describe how are you looking for a possible gap?
  + Why do you do it the way you do it?
* How do you use the mirrors?
  + What are you looking for in which mirror?
* When do you start the indicator to indicate the lane change?
* Does it matter to your behaviour on the ramp and for your merging decision if a vehicle is in front of you?
  + Does the type of vehicle (car/ truck) on ramp/through lane is relevant to you?
  + Why does it matter?
  + How does it change the merging task
* (What kind of information might help about the front vehicle?)
* Is there a difference on the ramp when you have one or two trailers?

Would you appreciate a system that informs you about approaching traffic?

Main goal: Decision of lane change, lane change (i):

Red line (ii + iii):

* How do you decide when to change lanes?
  + What is a crucial factor/ information for the decision?
  + When do you know that the rear vehicle is far away enough to merge?
  + Did you develop a strategy/pattern for merging?
* How does traffic density affects your decision?
  + Type of vehicle on through lane
* What circumstances might make you not to start merging?
  + Description of situation
  + What kind of behaviour of others
  + How would you like others behave in terms of driving style/ behaviour on the freeway
* What kind of dangerous situation have you experienced?
* Why did they occur?
* How could you or the other driver have prevented this situation?
* Please explain how the situation emerged (course of events)
* Do you try to obtain safe headways while merging?
  + Why not?
  + Which distance is more important to the front vehicle on the adjacent lane or the rear vehicle in the adjacent lane

Questions Part 2: Others traffic behaviour

1. How do cars behave most of the time while you are merging (both lanes)?
2. How do trucks behave most of the time (both lanes)?
3. How would you like other cars to behave while you are merging?
4. Describe your worst-case scenario of merging?
5. What kind of worst-case scenario of merging did you experienced? (If not already covered in the previous part)?
   1. What kind of strategies did you develop to overcome problems of less sight within merging?
6. How would you compare merging within dense traffic with merging within less dense traffic?
7. How does a shorter ramp length (i.e. construction work) changes your merging behaviour?
8. If you think about merging. What kind of information is in your mind that you have to consider?
9. How does the position (behind, in front of certain vehicle) you end up after merging on the freeway affects your overall trip?
10. What merging situations make you feel tensed?
11. How would you think do strategies for merging a truck compared to a car differ?

Assistance/Automation

* What do you think about assistance systems (such as FCW, ACC, CACC, lane keeping, warnings)?
* Do you have already a blind sport or camera monitor assistance system in your truck?
  + What do you like/dislike about the blind spot or camera-system?
  + Do you use it/ when do you turn it off?
* How do you think assistance systems such as ACC, FCW, LDW, LKA, BSA have changed driving on the freeway/ your job?
* Why do you like or dislike certain assistance systems?
* Do feel driving with assistance systems is less stressful/easier?
* What should be considered if there is more assistance systems on board?
* Where would you like it to be placed at in the cabin?
* What would you think about a system that informs you about the environment around with the same accuracy as mirrors but not having the classical mirrors on the truck (additional to the mirrors).

Truck business

* Does your driving style varies dependent on the freight you transport?

Demographic Data

Please indicate your gender.

Female  Male  Other

Do you have an assistance system in your truck?

Yes  No If Yes, please specify what kind of assistance system:

Do you use it? (leave out if previous question was answered with: No)

Adaptive cruise control:

Very often           Almost Never

Forward collision warning:

Very often           Almost Never

Lane departure warning:

Very often           Almost Never

Lane keeping assistance:

Very often           Almost Never

Cruise control:

Very often           Almost Never

Blind spot assistance/ lane change assistance:

Very often           Almost Never

Camera-monitor system rear-view:

Very often           Almost Never

Window in side door:

Very often           Almost Never

Emergency braking:

Very often           Almost Never

Fresnel lens:

Very often           Almost Never

Additional mirrors (more than the legally required ones):

Very often           Almost Never

For how many years are you driving a truck?

What is your age:

How many kilometres do you drive a year?

< 20 000 km  20 001-30 000 km  30 001-40 000 km  40 001-50 000 km

50 001-60 000 km  60 001-70 000 km  70 001-80 000 km  80 001-90 000 km

90 001-100 000 km  100 001-110 000 km  110 001-120 000 km  120 001-130 000 km

130 001-140 000 km  140 001-150 000 km  150 001-160 000 km  160 001 km <

How much of the time do you drive on the freeway?

10 %  20 %  30 %  40 %  50 %  60 %  70 %  80 %  90 %  100 %

What brand of Truck do you normally drive? (Multiple options)

* DAF
* Renault
* Mercedes Benz
* Volvo
* MAN
* Scania
* other
* What Type?\_\_\_\_\_\_\_\_(i.e. XF)

What kind of truck trailer combination do you normally drive?

* Truck without trailer
* Truck and trailer
* Truck and semi-trailer
* Else

Thank you for participation!