# ALE1 SSS2 – Driving Lessons

Task: Overtaking another car in different environments

## 1.1 What are the goals of the learning environment in relation to the specific task chosen?

- How to deal with affective states
- Sequence of actions
- Execution of actions
- Assessing situations
    - Safe to overtake?
    - What elements are involved?

## 1.2 What is the context in which the teaching is intended to take place?

- Interface between theory and application
- Learner sitting in front of screen with steering wheel and pedals

## 2.1 Who are the intended learners?

- Everyone taking driving lessons

## 2.2 How does the environment adapt, or customise its teaching, to the learners?

- Introduction by human agent
- Simulated agent
- Recognition of affective states – problem: stress may be hard to induce because of lack of actual danger
- Adapts on base of eye tracking
- Prompt actions you're not undertaking

## 2.3 Are both cognitive and affective aspects adapted to?

- Only focusing on cognitive aspects
- Automatizing procedures of overtaking

## 4.1 What approach does it take to teaching?

- Simulating driving situation and thereby preparing learners for driving on the roads (Underwood 2011), training young drivers to successfully "scan areas of the roadway for potential risks in situations that are hazardous but nor obviously so" (Pradhan, 2009)
- Andes physics tutor ? Coached problem solving ("Coached problem solving occurs when a tutor and a student solve problems together" (VanLehn 1996, 29))
- A simulated agent helps to connect theoretical knowledge and practical use by providing hints and prompts as to assessing situations and guiding learners attention

## 4.2 Why is this approach suitable for this task?

- It gives the learners some kind of driving experience in a safe environment
- Agent is the systems way of giving feedback to the learner about the sequence of actions they take in order to overtake and accessing whether the learner has an understanding of why these actions have to be taken

## 5.1 How does the system interact with the user?

- An agent is using natural language dialogue in order to introduce the situation, ask the student to judge the situation, give prompts or hints if the student is having difficulties deciding which actions to take or if the students is taking wrong actions.
- The student is equipped with a wheel and a pedals in order to navigate within the simulated driving environment. Speed and direction is thereby controlled by the student. Eye tracking is used to access whether the student is visually attending to the important aspects while overtaking.
- The agent gives immediate feedback whether the students looking patterns are appropriate to the action that they are performing during overtaking. This allows the system to evaluate how well the student is performing on the different elements of the whole task and can therefore adapt prompts and hints in order to emphasize attention on elements of the task which the student performed poorly on.
- If the student handles the situation well, the level of difficulty increases for the next one. If the student is unsure about the situation or if looking patterns are not matching the actions taken, a similar situation will be presented.

## 5.2 Describe an example interaction: you may use possible screen shots, hypothetical dialogues, etc.


Figure 1: Proposed setup based on images from Best Glass (Retrieved 03-2018), Texas Instruments (Retrieved 03-2018), and Autointhebox (2017).

## Bibliography

Best Glass (Retrieved 03-2018). Side View Mirror Replacement. https://www.bestglass.com/side-view-mirror-replacement.html

D'mello, Sidney, and Art Graesser. "AutoTutor and affective AutoTutor: Learning by talking with cognitively and emotionally intelligent computers that talk back." *ACM Transactions on Interactive Intelligent Systems (TiiS)* 2.4 (2012): 23.

Pradhan, A. K., Pollatsek, A., Knodler, M., & Fisher, D. L. (2009). Can younger drivers be trained to scan for information that will reduce their risk in roadway traffic scenarios that are hard to identify as hazardous?. Ergonomics, 52(6), 657-673.

Texas Instruments (Retrieved 03-2018).Automotive Chipsets – Head-up display, True augmented reality. http://www.ti.com/dlp-chip/automotive/applications/head-up-display-hud.html

Underwood, G., Crundall, D., & Chapman, P. (2011). Driving simulator validation with hazard perception. Transportation research part F: traffic psychology and behaviour, 14(6), 435-446.

VanLehn, K. (1996, June). Conceptual and meta learning during coached problem solving. In International Conference on Intelligent Tutoring Systems (pp. 29-47). Springer, Berlin, Heidelberg.

Autointhebox (2017). How to choose the right mirror for your car? http://blog.autointhebox.com/how-to-choose-the-right-mirror-for-your-car.html