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Project Summary

This project aims to change how drivers engage with, and practice, their theory knowledge, and how they develop their hazard perception (HP) skill. Currently, learner drivers engage with separate mock tests including multiple-choice theory questions and example HP clips. Such practice gives little context for theory questions, and likely over-estimates real-world HP ability (as attention is focused solely on hazard identification, unlike real driving).

We will design a new training tool combining highway code questions with HP assessment within a single, 10 minute driving clip (using computer-generated imagery). The clip will contain scripted hazards requiring timed button-responses, and will frequently pause for multiple-choice questions to appear on the screen. Once an answer is selected, the clip will resume playback. In this way, the theory questions will have context, while anticipation of the questions will create a more realistic cognitive load for the HP task. This practice assessment will be coupled with a variety of feedback techniques designed to train drivers in a more immersive, engaging, environment, under more realistic conditions than existing training packages.

We will then validate the tool: first by assessing whether it can discriminate between safe and less-safe drivers, and then by investigating the appeal and effectiveness of the training. The final validated tool will be freely accessible online as part of the project outcomes, via a purpose-built website. This will act as a forerunner for a suite of future training package, and a possible blueprint for the next iteration of the official theory/HP tests.

Background

Novice drivers are over-represented in collision statistics, and evidence demonstrates that skill deficits are a significant contributor to this crash risk. Unfortunately, the driving test does not adequately assess all required skills, and training is failing to prepare drivers for post-licensure driving. One area that could benefit from improvement is the computer-based assessments of theory knowledge and hazard perception (HP) skill, and the associated training techniques that have been developed to support them (e.g. mock multiple-choice tests; training DVDs of HP clips). This section will outline flaws in these tests and their practical impact on training, before subsequent sections will offer a solution:

1. The theory test presents questions usually devoid of context, removing real-world cues to stored knowledge, but also removing the additional driving demands that may interfere with knowledge recall while on the road. A more realistic test of applying theory knowledge needs greater context. This lack of context is particularly apparent in the 'what would you do next?' questions which are supported by simple, static images.
2. The current HP test has several flaws:
   a. Short clips are unrealistic, do not require prolonged vigilance, and provide a disjointed experience. Longer, and more immersive clips are better discriminators of HP skill (Crundall et al., 2016).
   b. Criterion bias influences HP response times (e.g. safer drivers may respond later

because they have a higher threshold for what constitutes a hazard, Ventsislavova, Crundall et al., 2017; Crundall et al., 2003).
   c. Unlike a real driving situation, viewers of the clips have no access to the intention of the driver and this introduces an additional, unrealistic component to the task (e.g. they are not expecting the car to turn right, and are less likely to be looking into the side road for hazards than they would if they were driving). This reduces the likelihood that we are measuring a real-world skill;
   d. Drivers know they are looking for a hazard. There are no other demands on their attention as there would be during real driving, leading to potential over-estimation of real-world HP skill.
3. Testing and training need to be engaging. Context-free theory questions are decidedly not. The HP test provides a more engaging medium, which could be expanded to include assessment of the Highway Code, creating a 'holistic' testing platform that trains drivers through error-based feedback. More importantly, the combination of the two tests will create a more realistic dual-task approach that will give drivers better preparation for both spotting hazards and using Highway Code information in the real world.

The challenge is to improve driver-training and assessment by addressing these flaws in a creative and innovative way, providing a new training tool for learner drivers. Wider benefits include:
   - improved learner knowledge and skills with a concomitant reduction in crash risk;
   - opportunities to develop the format for other road-users (emergency services, mobility scooter users)
   - a blueprint for future iterations of the official theory/HP test.