Online video simulations as an effective way of teaching drivers new road rules

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Abstract

Within the 14 days leading up to a recent change of two give way rules in New Zealand, the website www.giveway.co.nz had more than 340,000 active visitors who used a give way training programme to prepare for the rule change. It was shared 16,000 times on Facebook and tweeted over 300 times. It was emailed around workplaces and posted on numerous online bulletin boards. Our approach complemented the New Zealand Transport Agency's $1.2 million education campaign. This paper will present a descriptive analysis of the large data set we gathered in the backend database of the website, including the average percentage of correct answers overall (90%) and for each question, and average time it took the users to answer correctly overall (4.345s) and for each question. The paper will provide insights into the psychology of educating a very large number of drivers using an effective online interactive driver training resource, promoted predominantly via social media.

Key words: Online video simulations, give way rule change, training programme, social media

1. Introduction

Online video-based traffic simulations, filmed from the driver's perspective, are an effective way of teaching learner drivers the visual search, hazard perception and risk management skills, crucial for safe driving (Isler & Isler, 2011). It also has been shown previously, that learner drivers were able to improve their hazard perception skills off-road and that these new skills were transferred and applied successfully to real driving situations (e.g., Mills, Rolls, Hall & McDonald, 1998; Chapman, Underwood & Roberts, 2002; Fisher, Pollatsek & Pradhan, 2006). However, as far as we know, the method of using online video simulations has never been adopted to retrain drivers in regards to new road rules.

We used 14 online video simulations to put drivers (inexperienced and experienced) in authentic traffic situations where they had to make 'yes'/'no' decisions at intersections, applying the two newly introduced give way rules in New Zealand (in place since 25 March 2012). The programme went 'viral' via social media, highlighting the potential of using our approach for delivering driver education initiatives effectively, in a space where they are not just accepted by the audience, but indeed actively promoted. Our approach appears to be novel, as we were not able to locate any similar studies, investigating the impact of changed road rules, where drivers must keep up to date with the changes at their own volition.

For the current study, we were able to gather performance data of more than 340,000 users in order to assess the level of learning that occurred during the two weeks before the rule change was put in place by the New Zealand Transport Authority (NZTA). The aim of the programme was to teach a large group of drivers an important behavioural change and to evaluate the effectiveness of using online video-based simulations as a means of achieving this goal.

2. Method

2.1. The give way training programme

The online give way training programme (www.giveway.co.nz) (see Figure 1, left for homepage design), produced by eDrive Solutions Ltd., was aimed at teaching drivers two new give way rules in New Zealand (in place since 25 March 2012). The first new rule now requires all traffic turning right to give way to a vehicle coming from the opposite direction and turning left. The second rule is related to uncontrolled T-intersections, where all traffic from a terminating road (bottom of the T) is now required to give way to all traffic on a continuing road (top of the T). The users were first able to click on a menu item ('The new rules'), which explained them the new rules in form of diagrams from a bird's perspective. The diagrams were sourced from www.giveway.govt.co.nz. with permission.

The give way training programme consisted of 14 trials of video-based driving simulations from the driver's perspective. They were presented in the same order to all participants. Each trial started a scenario of the user's vehicle approaching an intersection, where the user/driver was confronted with a decision relating to the two new give way rules, with a vehicle approaching from the opposite direction. At the decision point, the video stopped and a question popped up 'Do we need to give way to the turning vehicle?,' with the answers 'Yes' or 'No'. If the driver clicked on the correct answer, a green tick was displayed beside the correct answer (see Figure 1, middle), a pleasant bell sounded, and the video continued to display the correct turning manoeuvres.

If the incorrect answer was clicked, a diagram (taken with permission from the NZTA education material) showed the situation from a bird's eye view and the video still picture was overlaid with red (approaching vehicle) and green (user's vehicle) to match the diagram in order to facilitate learning (see Figure 1, right). There was a progress bar on the bottom, indicating how many of the 14 trials have been completed and answered correctly (green segments) or incorrectly (red segments). The 14 trials demonstrated all possible decision scenarios of the two rule changes as (see below). The trials 9 and 10 presented scenarios relating to the second rule change (T-intersection), while the remaining scenarios presented the first rule change, either controlled (Give Way sign (3,4), Stop sign (5,6) night driving involving a cyclist (13,14), or traffic lights (7,8)) or not controlled (1,2 and 11,12 night driving involving a cyclist):

First new rule

- Trial 1: User vehicle turns right and needs to give way to approaching vehicle (neither vehicle is controlled)
- Trial 2: Approaching vehicle is turning right and has to give way to user vehicle (neither vehicle is controlled)
- Trial 3: User vehicle turns right and needs to give way to approaching vehicle (both vehicles are controlled by Give Way sign)
- Trial 4: Approaching vehicle turning right needs to give way to user vehicle (both vehicles are controlled by Give Way sign)
- Trial 5: User vehicle turns right and needs to give way to approaching vehicle (both vehicles are controlled by a Stop sign)
- Trial 6: Approaching vehicle turning right needs to give way to user vehicle (both vehicles are controlled by a Stop sign)
- Trial 7: Night time driving: User vehicle turns right and needs to give way to approaching vehicle (both vehicles are controlled by a traffic light)
- Trial 8: Night time driving: Approaching vehicle turning right needs to give way to user vehicle (both vehicles are controlled by a traffic light

Second new rule

- Trial 9: User vehicle is approaching a T-intersection on the terminating road and needs to give way to vehicle tuning right on the continuing road
- Trial 10: Approaching vehicle on the terminating road of a T-intersection needs to give way to the user vehicle on the continuing road, turning right.

First new rule cont.

- Trial 11: Night time driving: User vehicle turns right and needs to give way to the approaching vehicle and to a cyclist (neither vehicle or cyclist are controlled)
- Trial 12: Night time driving: Approaching vehicle turning right needs to give way to user vehicle and cyclist (neither vehicle or cyclist are controlled)
- Trial 13: User vehicle turns right and needs to give way to an approaching cyclist (both vehicles are controlled by a Stop sign)
- Trial 14: A cyclist turning right needs to give way to user vehicle (both vehicles are controlled by a Stop sign)

Figure 1. The give way programme website: home page (left), a 'correct trial' (middle) and an 'incorrect trial' feedback screen (right)

2.2. The data gathered and analysed

We used Google Statistics in order to monitor the usage of the website and how long on average each person was using the site. For each participant we recorded for each trial a) whether they chose the correct or incorrect answer and b) how long it took them to click on one of the two answers ('decision time').

3. Results

The following will report the analysed data we gathered over the two weeks (week 1: 11-18 March 2012 and week 2: 19-25 March 2012), prior to the two new give way rules coming into effect (25 March 2012).

3.1. Usage

Google Analytics revealed that in the first week the give way training programme had 72,025 active users and that in the second week, 243,282 users attempted the programme. In the first week, the users (13.62% were returning) spent on average 02:08 minutes on the website, while in the second week the users (20.97% were returning) spent on average 02:14 minutes on the website. Most users visited the website on Thursday (48,768) and Friday (48,728) before the change. Weekend days had the lowest number of visitors. Of the 315,307 users, 70% completed all 14 trials of the give way programme.

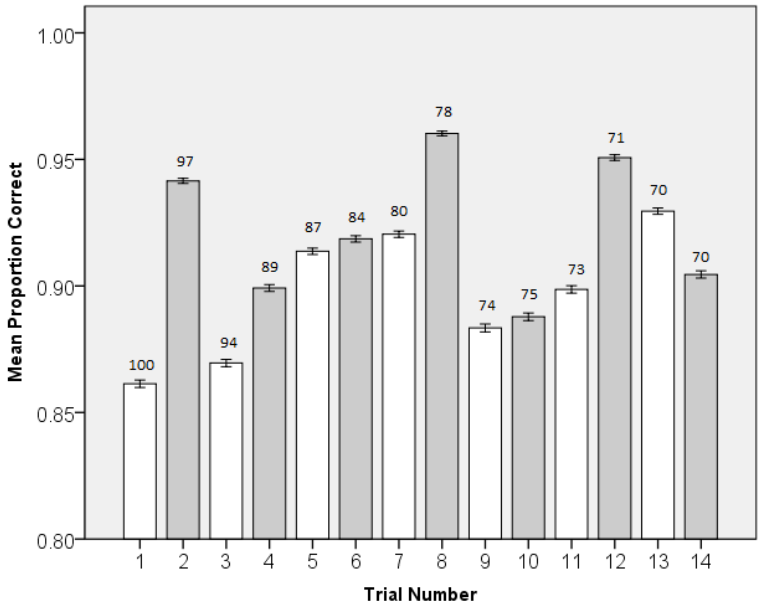
3.2. Proportion of correct and incorrect responses overall and for each trial

In the first week, the average proportion of correct responses was 0.9014 (SD=0.298) and the average decision time was 4:30 seconds (Number of trials analysed N=565,010), while in the second week the average proportion of correct trials was slightly higher at 0.9109 (N=1,936,453) and the average decision time was a little longer at 4:38 seconds.

Visual inspection of Figure 2 below reveals a large difference between the first and second trial (same traffic situation, but the user needed to give way to the approaching vehicle in the first

trial, while in the second trial the approaching vehicle had to give way). The mean proportion of correct responses was much smaller for the first trial (0.86) compared to the second trial (.98). The proportion of correct trials was again much smaller for trial 3 and then improved continuously until trial 8. The trials 9 and 10 showed traffic situations demonstrating the second give way change at T-intersections, which received relatively low proportions of correct answers (0.87 and 0.88 respectively). The trials 11 and 12 were repeats of trials 1 and 2, but filmed at night and additionally there was a cyclist on the cycle lane that the participant had to watch out for. In particular, trial 12 seemed challenging as the participant who was turning left had to give way to the cyclist on the left side of the vehicle, intending to go straight. Interestingly, this trial had the third largest proportion of correct responses (0.95). In trial 14, an approaching cyclist had to give way to the participant's vehicle and this trial received a rather low proportion of correct responses with short decision times.

Figure 2. Mean proportion of correct responses (pooled over both weeks) for each trial. The white columns indicate traffic situations where the user had to give way to the approaching vehicle. The number on top of a bar indicates the percentage of participants of the sample (100 % = 315,305) who have attempted that trial. The error bars indicate 95% confidence intervals.

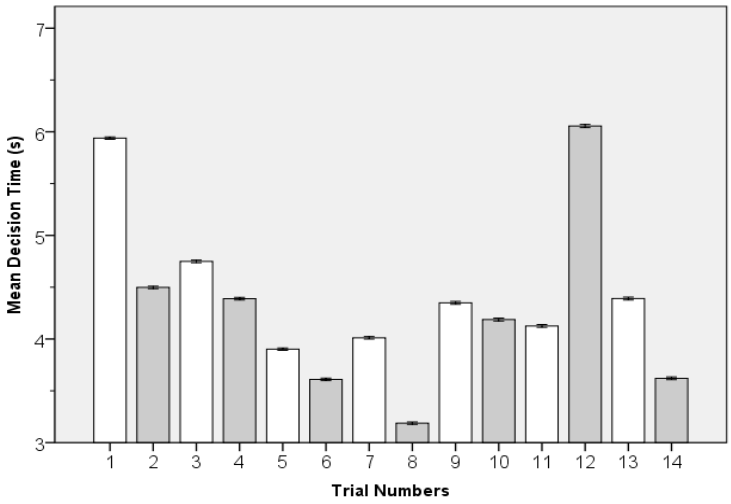


3.3. Decision times overall and for each trial

In the first week, the average decision time for all trials (N=565,010) was 4.300 seconds (SD=2.903) and slightly longer in the second week (4:384 seconds, SD=2.911, N=1,936,453).

Figure 3 reveals almost a reverse picture to Figure 2; trials with lower count of correct responses had corresponding longer decision times, and vice versa, except for trial 12 and to a lesser degree, trial 14. As mentioned before, trial 12 was challenging for the users as they were turning left and had to give way to the cyclist on the left side of the vehicle on a cycle lane intending to go straight. This trial produced the second longest decision times. On the other hand, trial 14, in which the approaching cyclist had to give way to the user vehicle, received a relatively short decision times, implying that decisions were made quickly.

Figure 3. Mean decision time (pooled over both weeks) for each trial. The white shaded columns indicate traffic situations where the user had to give way to the approaching vehicle. The error bars indicate 95% confidence intervals.



4. Discussion

The results showed clearly that our give way programme was heavily used by New Zealand drivers for practicing the two new give way rules. There were 315,305 users who attempted the first trial and 70% of the users completed all 14 trials and thus by implication, the programme was obviously needed and considered as a useful training tool. We received only positive feedback about the programme - as shared within the social media. A few participants commented however, that the cyclist in trial 12 was overtaking illegally on the left side, but they missed the fact that the cyclist was on a dedicated cycle lane. During the second week (closer to the rule change date), the users had slightly higher proportions of correct responses. This was to be expected, as the drivers became more educated about the new rules changes. The relatively long decision times of about 4 seconds overall for both weeks were, however, a concern. In real traffic, the drivers would not have the 'luxury' of taking that length of time for making give way decisions. Therefore, the proportion of correct responses of drivers in real live traffic, with increased time pressure, would possibly have been lower, as compared to the simulations.

The second rule change at T-intersections seemed certainly more difficult for the users to learn, as there were less correct responses and longer decision times for the trials 9 and 10, compared to the other trials presenting the first rule change. Overall, clear learning effects were visible as the number of correct responses clearly increased and corresponding decision times decreased, for the first 8 trials, which demonstrated the first rule change.

Trial 12 seemed particularly challenging as the participant who was turning left had to give way to the cyclist on the left side of the vehicle, intending to go straight. But interestingly, this trial had a large proportion of correct responses (0.95) but at the same time received long decision times. It seems that the participants carefully thought about this situation before they responded and this might have resulted in the many correct responses. On the other hand, trial 14, in which the approaching cyclist had to give way to the user vehicle, received a relatively low proportion of correct responses and relatively short decision times, implying that decisions were made quickly and often incorrectly.

One could argue that the users might have learned the simple repetitive response pattern for the questions (i.e., Yes, No, Yes, No etc.), but there was little evidence supporting this, as the proportion of the correct responses decreased dramatically after trial 8, reflecting the more difficult content of trial 9, thus discounting the use of simple response pattern. It is difficult to discuss the results in the light of the existing road safety literature as we were not able to find any comparable studies. However, as mentioned in the introduction, some studies showed transfer of skills learned via video simulations to on-road driving (e.g., Mills et al., 1998), which could indicate that our programme might have helped to avoid problems the drivers would have faced adjusting to the new rules in real traffic situations.

5. Conclusions

Overall, the results confirmed that using online traffic video simulations proved to be an effective way of teaching a large number of New Zealanders the imminent road rule change. Using social media helped with the distribution of the programme, without needing a marketing budget. This is encouraging, as it shows that given the right tools, which are enjoyable and easy to use, people will readily share and promote driver education initiatives amongst their networks.

Acknowledgments

The authors would like to thank BP New Zealand and Suzuki New Zealand for sponsoring the give way training programme and the New Zealand Transport Agency (NZTA) for checking the video simulations for technical accuracy. Thanks to Andrew Malcolm from Optiweb Ltd. for engineering the training software, including the production of the video simulations, and Webfit Ltd. for designing the website and creating its functionality. Finally, thanks to Steve Cantwell, Dennis de Jong, and Ben Cleland for their help with the filming of the give way scenarios.

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