Title: Development and Validation of a Hazard Perception Test for Thai Drivers

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Summary:

We developed a Thai hazard perception test, including video footage of 77 different road hazards. This test was validated in a sample of 139 novice and experienced Thai drivers, revealing a subset of clips that were optimal in distinguishing between good and bad drivers.

Aim of Research.

The aim of the research was to develop a test that can be used to assess hazard perception abilities in Thai drivers. Hazard perception refers to an individual's capacity to *detect* and *assess* the seriousness of dangers on the road; for example, noticing a pedestrian approaching a crossing or another car about to merge into your lane of traffic. Poor hazard perception is a significant predictor of increased risk for driving accidents and has been studied extensively through the development of country-specific (e.g., Netherlands, UK, Australia, Spain) hazard perception tests. Hazard perception tests typically involve a person viewing video footage of a driving situation where they are required to indicate as soon as they identify a potential hazard. Further, in recognition of the importance of hazard perception abilities, hazard perception tests are being adopted in many countries as part of the formal requirement for obtaining a driver licensing. Given the potential importance of hazard perception for traffic safety and accident risk, it is perhaps surprising that relatively little is known regarding the hazard perception abilities of Thai drivers. However, at present there are no valid tools designed to assess hazard perception in Thai drivers and, given the significant differences between driving environments in Thailand and Western countries, it is not possible to effectively assess hazard perception abilities using pre-existing tests.

Consequently, we aimed here to develop a Thai hazard perception test (Thai-HPT) that featured driving environments from rural and urban areas in Thailand that have been selected using a rigorous review process and validated on a sample of novice and experienced Thai drivers

Method of Research & Progression.

The first stage of the research required obtaining appropriate stimuli to be adopted in the Thai hazard perception test. We did this by installing a dashboard camera into the cars of volunteers (known to the research team) that would record footage of driving in Bangkok and rural areas of Thailand. To ensure the footage features representative situations from a diverse range of potential conflict situations, we collected >300 hours of footage, featuring approximately 200 potential incidents. All footage was viewed by a researcher to identify potential hazard incidents that could feature in the final test.

Each potential incident was then reviewed by two trained research assistants and the lead researcher who each examined the suitability of the footage for use in the hazard perception test according to multiple criteria. Clips were approved for the final test if they fit the following criteria: (1) it has acceptable image quality, (2) there is a clear view of the road ahead, (3) it contains clear cues to predict a potential hazard conflict, (4) each traffic conflict is distinct from other hazards, (5) the footage car was required to respond to the hazard. In the second stage, two independent judges reviewed this subset of footage and rate each based on the quality of the anticipatory cues in each scene; the clips with the highest ratings were retained for use in the Thai hazard perception test. We retained 77 clips for the test and edited each clip to be appropriate length.

To validate the Thai-HPT we administered the clips containing potential traffic conflicts to a sample of 139 participants, comprising novice experienced drivers. Participants were presented each of the clips in a randomised order and instructed to press a response key as soon as they identified a traffic conflict.

Results of Research

To examine the validity of the Thai-HPT in discriminating low *vs.* high crash-risk drivers we compared the (standardised) hazard perception scores across all trials for novice and experienced drivers. We also analysed performance for a subset of drivers who were experienced and older, and therefore might have poorer coordination abilities.

Figure 1. Boxplot of standardised reaction time scores split by level of driving experience (lower scores = better performance)
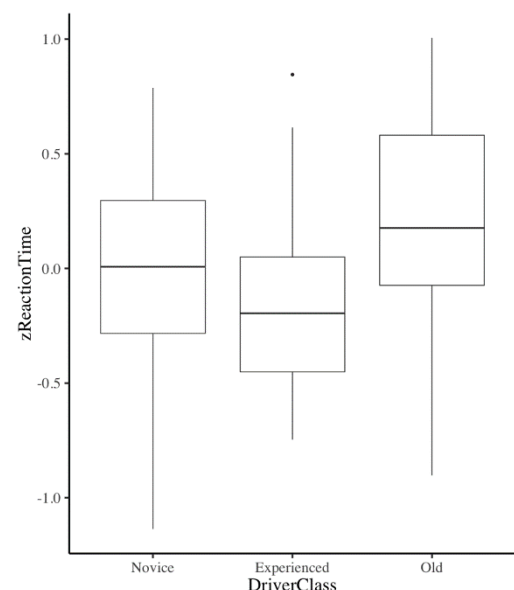
This revealed small but important performance differences whereby experienced drivers were faster (i.e., lower reaction time score) than novice drivers across all of the hazard perception trials.

Note. All validated clips are viewable on the Open Science Framework here: https://osf.io/3jsgm/?view_only=268b5150970b41d0af1560e16ee793e5

To identify the best clips from the pool of 77 we examined the reaction time data for each clip and retained those clips that had the greatest variability in reaction time and where there was the greatest effect of driving experience on reaction time.
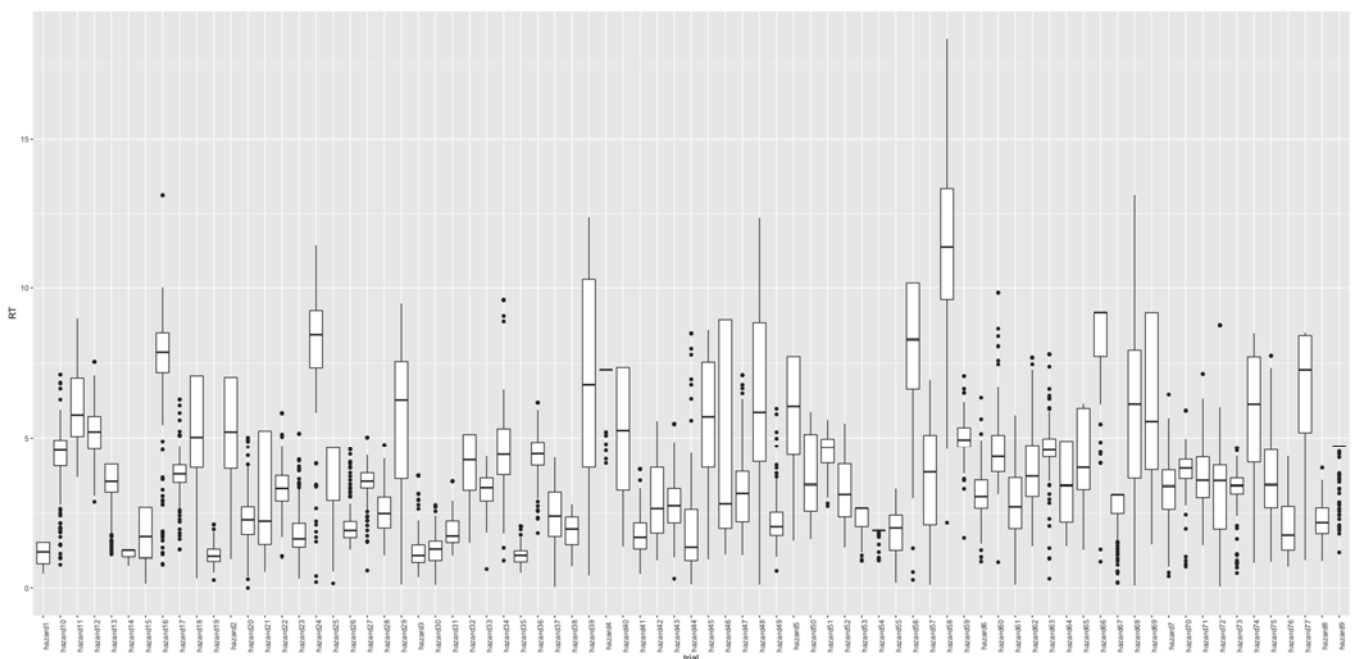
Figure 2. Boxplot of reaction time (seconds) across each trial in the HPT.

Future Areas to Take Note and Going Forward.

The purpose of developing the hazard perception test was to provide a tool that can be used by researchers to accurately assess hazard perception ability in order to potentially:

- Understand the individual difference factors that predict better and worse hazard perception abilities
- Incorporate as part of the licensing requirement for drivers to demonstrate they have adequate perception ability.
- Examine how hazard perception varies with age and as an indicator that elderly drivers are safe/unsafe to be on the road.

Means of Official Announcement of Research Results.

This paper is in the process of being written up for dissemination in: *Recent Transportation Research Part F: Traffic Psychology and Behaviour Articles*