

Title: DRIVERS PERCEPTION OF VULNERABLE ROAD USERS – A HAZARD PERCEPTION APPROACH

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Abstract:

According to the Israeli Road Safety Authority in 2008 the total number of fatal and serious injuries from traffic crashes in urban areas was 20,807 compared to 11,004 in intercity areas where the total number of injured pedestrians was 3131 and 186 respectively. Although, pedestrian injuries are more likely to occur in urban areas, fatal accidents are more likely in intercity areas. Thus, conflicting situations involving pedestrians are more typical of residential and urban areas than intercity areas. Yet, atypical situations in which pedestrians interact with drivers at unexpected locations are detrimental. Obviously, drivers in intercity areas adopt higher speeds, therefore, given a crash occurs its outcome is more likely to be detrimental. Nevertheless, beside travel speed hazard perception should also be considered. The ability to anticipate an upcoming hazardous situation is dependent on drivers' expectations and past experiences (e.g., Borowsky et al., 2007, Pollatsek et al., 2006; Horswill and McKenna, 2004). Experienced drivers who tend to categorize traffic scenarios according to the similarity in their traffic environment characteristics (Borowsky et al., 2009), might, for example, expect seeing pedestrians crossing the road more in residential areas than in inter-city areas. Thus, the appearance of a pedestrian in such atypical environment, may take more time for a driver to perceive (Borowsky et al., 2008), and may also require application of maneuvers that are not well practiced relative to the typical pedestrian-related situations. To assess hazard perception abilities of drivers we ask participants to observe traffic-scene videos and press a button when they perceive a hazard. We have found that, in general, experienced drivers tend not to indicate pedestrians as hazard instigators when the environment is inter-urban, whereas they do tend to do so when the environment is residential, even if no pedestrian was actually present. Parked cars, buildings, zebra crossings, etc., probably indicate drivers of the possibility that pedestrian may suddenly appear. One additional concern that has been raised is with the ability of elderly drivers to maintain their hazard perception skills. In Borowsky et al. (2009, submitted) we examined hazard perception abilities among elderly (65+) and experienced drivers (25-32), also with regard to the presence of pedestrians in the road environment. Previous studies suggested that Hazard perception abilities are not affected (although older drivers tend to compensate for their deteriorating driving abilities) (Ball et al., 1998; DeRaedt & Ponjaert-Kristofferson, 2000; Hakamies-Blomqvist, 1994). Consistent with others (e.g. Underwood et al., 2005), our findings indicated that older drivers are as likely as younger drivers to perceive hazards. Older drivers, however, tend to rely more on other users intentions (e.g., they were highly concerned when a driver in front of them did not signal) and to indicate an intersection as hazardous much closer to the intersection than younger drivers. Such findings might indicate that they are aware of the extra time they need in order to execute an action and try to avoid surprises. Recently, Cavallo et al. (2009) have showed that elderly pedestrians (70+) based their decisions and actions of whether or not to cross the road when a vehicle approaches on distance-based heuristics whereas younger pedestrians (20-30 years-old) based it on constant-time mode (angular

velocity) independent of the vehicle speed. The distance-based heuristics resulted in more risky decisions and actions when the approaching vehicle speed increased. This is highly interesting because both older drivers and older pedestrians seem to perceive the hazard well but base their actions on different criteria than those probably used by younger drivers.

To conclude, our studies on hazard perception elicited two pedestrian-related factors. Based on our findings, we first suggest that drivers' expectations play a key role in their ability to project and detect hazards in advance (proactive behavior). Therefore, unexpected locations in which pedestrians may appear should include road signs to enhance drivers' awareness of the possibility that a pedestrian may cross the road (similar to work zones signage indicating the possible appearance of unexpected heavy vehicles). Secondly, with respect to older drivers, although they tend to compensate for their deteriorating driving abilities, it would be intriguing to examine how they perform when circumstances, such as driving in unexpected pedestrian-related situations, are dictated. The additive contribution of age-related deficiencies and wrong expectations may be detrimental.