Accident Analysis and Prevention 44 (2012) 97–103

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Attention and search conspicuity of motorcycles as a function of their visual context

Pnina Gershon*, Noam Ben-Asher, David Shinar

Department of Industrial Engineering and Management, Ben-Gurion University of the Negev, Beer Sheva, Israel

ARTICLE INFO

Article history:
Received 14 June 2010
Received in revised form
13 December 2010
Accepted 14 December 2010

Keywords:
Powered two-wheel (PTW)
Search conspicuity
Attention conspicuity

ABSTRACT

Background: Over the years, PTWs' number of accidents have increased dramatically and have accounted for a high percentage of the total traffic fatalities. The majority of those accidents occur in daylight, clear weather, and at light to moderate traffic conditions. The current study included two experiments. The first experiment evaluated the influence of PTW attention conspicuity on the ability of un-alerted viewers to detect it, whereas the second experiment evaluated the PTWs search conspicuity to alerted viewers. The independent variables in both experiments included driving scenarios (urban and inter-urban), PTW rider's outfit (black, white, and reflective) and PTW distance from the viewer.

Method: 66 students participated in experiment 1. Every participant was presented with a series of pictures and was asked to report all the vehicle types present in each picture. Experiment 2 included 64 participants and incorporated the same pictures as experiment 1. However, in this experiment the participants were instructed to search the pictures for a PTW and to report its presence or absence as soon as they reach a decision.

Results: In experiment 1 the detection of a PTW depended on the interaction between its distance from the viewer, the driving scenario and PTW rider's outfit. For an un-alerted viewer when the PTW was distant the different outfit conditions affected its' attention conspicuity. In urban roads, where the background surrounding the PTW was more complex and multi-colored, the reflective and white outfits increased its attention conspicuity compared to the black outfit condition. In contrast, in inter-urban roads, where the background was solely a bright sky, the black outfit provided an advantage for the PTW detectability. In experiment 2, the average PTW detection rate of the alerted viewers was very high and the average reaction time to identify the presence of a PTW was the shortest in the inter-urban environment. Similar to the results of experiment 1, in urban environments the reflective and white clothing provided an advantage to the detection of the PTW, while in the inter-urban environment the black outfit presented an advantage. Comparing the results of the two experiments revealed that at the farthest distance, the increased awareness in the search conspicuity detection rates were three times higher than in the attention conspicuity.

Conclusions: The conspicuity of a PTW can be increased by using an appropriate rider's outfit that distinguishes him/her from the background scenery. Thus, PTW riders can actively increase their conspicuity by taking into account the driving route (crowded urban/inter urban), eventually increasing the probability of being detected by the other road users. In addition, increasing the alertness and expectancy of drivers to the presence of PTWs can increase their search conspicuity.

1. Introduction

Powered two-wheelers (PTWs) add up to a small share of the total motorized traffic. However, they are highly over-involved in the accidents statistics (Shinar, 2007). According to the U.S. National Highway Traffic Safety Administration's 2008 Traffic Safety Annual Assessment (2009), motorcyclist fatalities increased dramatically in the recent decade, accounting for 14% of the total U.S. traffic fatalities. Similar statistics were collected in Great Britain, where motorcycles were involved in 14% of all fatal injuries although they accounted for less than 1% of the vehicle population (Clarke et al., 2004). The increase in the number of PTWs (especially the heavy ones), the increase in accidents involving PTWs, and the vulnerability of the riders, all together contribute to the concern for motorcyclists' safety (Shinar, 2007). An in-depth study (MAIDS) conducted in Europe revealed that 73% of PTWs' accidents occurred at daytime, 90% of them were in clear weather conditions and 85% in light to medium traffic density (ACEM, 2004). Similar findings

* Corresponding author.
E-mail address: pninage@bgu.ac.il (P. Gershon).

0001-4575/$ – see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.aap.2010.12.015