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The Research of Driver Distraction by Visual Smog on Selected Road Stretch in Slovakia

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Abstract

Driver distraction is one of the most common cause of traffic accidents in all countries. The previous research has shown that digital billboards can take the driver attention for more than one second. Therefore, the aim of the article is to research how can visual smog influence the driver behaviour. The road stretch in Žilina has been chosen for measuring the driver distraction by visual smog next to the road. The analysis of visual smog and traffic accidents on the selected road is included in article. Eye tracking glasses has been used to scan the gaze of driver eye. Part of the experiment was EEG device, used to record brainwave data during the testing of impact of visual smog to driver. The results regarding of driver gaze at visual smog are awful considering that the average dwell time of one billboard was more than a half second. On the other side, the average dwell time of traffic sign was only 0,2 second. In generally we can state that visual smog can influence the driver behaviour which can lead to traffic accident. For all that it is necessary to reduce the increased number of visual smog next to the road which can lead to fewer traffic accidents.

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1. Introduction

The advertisement next to the road is a common sight on urban roads. Previous research suggests the presence of advertising increases mental workload and changes the profile of eye fixations, taking attention away from the driving task. Driver distraction is one form of driver inattention and is claimed to be a contributing factor in more than half of crashes. As we entered the twenty-first century, the driving task is more complex than ever before (Young and Mahfoud, 2007). There are not only distractions available within the vehicle, like radio, navigation or mobile phone, but the environment outside the car has also become more and more complex. Billboards, advertising pillars, shop fronts and video screens are just a few examples. For these reasons the potential risk of driver distraction which could lead to driver accident is rising.

Nowadays, more and more cars are on the road. The amount of visual information is increasing on the roads, due to higher traffic density, more complex traffic management systems, increased commercial roadside development and increasing pressure on road authorities to permit advertising next to major roads (Madlenakova, 2016; Kolarovszki, 2016). Road safety greatly depends on how drivers drive their vehicles. Their alertness is very significant to avoid crashes (Kalasova *et al.*, 2015). However, attentiveness easily wobbles now because of increased number of distractions on the road and inside the vehicle. Advertisement next to the road, in fact, could be bigger and inevitable distractions. The reason is, one can switch off his mobile phone and avoid food and drinks, but only hardly can ignore colourful and attractive billboards, especially when they are giving a strong message or exhibit teaser. Since they are now in abundance on important roads and highways, traffic safety has become a challenge (Lam, 2002; Krizanova, 2008).

The power of roadside advertisement can be determined from its purpose which is to grab one's attention. In other words, its aim is to distract drivers and motorists while driving which increases the chances of accidents (Chattington *et al.*, 2009). However, roadside advertisement loses its power when it goes unnoticed. If billboards are unable to distract drivers, then they have no influence on them at all. Thus, drivers can still avoid crashes by controlling visual distractions caused by billboards and roadside advertisements.

Levels of distraction vary with particular features of roadside advertisements (Pettitt *et al.*, 2005). For instance, it has been found that moving objects are more captivating than fixed or immovable things. Equally, static billboards are relatively less distracting than dynamic or digital billboards. The express appearance and disappearance of messages and objects on a billboard is difficult to ignore. In addition, studies reveal that moving parts of a billboard are capable of grabbing one's attention for a longer time. The next powerful distracting factor of roadside ads is the type and tone of message. It has been found that negative messages are more distracting and captivating than the positive messages (Olson *et al.*, 2009).

The term roadside advertising is used to include all advertising signs and devices which are intended to be seen by all road users including motorist, motorcyclists, cyclists or pedestrians (Klauer *et al.*, 2006). Roadside advertisement includes advertising that is:

- located within the road boundaries,
- located on private property near a road,
- permanent or fixed in nature,
- temporary or movable in nature,
- vehicle-mounted advertisement or other advertisement on vehicles.

Examples of roadside advertisement are balloons or blimps, banners, billboards, election signs, flags, posters and posters boards, tavern signs, sign installed on vehicles, video advertising screens and wall-mounted signs (Beijer *et al.*, 2004). All this examples of visual smog may distract the driver what can lead to crisis situation or traffic accident (Smiley *et al.*, 2004).

There are four ways in which roadside advertisement can contribute to traffic accidents:

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