Effects of age in Useful Field of View and Time-to-Arrival

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Abstract

The main aim of this study was to investigate possible age effects in Useful Field of View (UFOV) and Time to Arrival (TTA). Ninety-six male and female active drivers participated in this research: 32 young drivers (18-30 years old), 32 middle-aged drivers (38-50 years old) and 32 older drivers (60-75 years old). Concerning to UFOV, results showed that older drivers had poorer results in divided attention and selective attention. Furthermore, some nonlinear variation occur, revealing a much more evident decrease in visual attention performance from the middle-aged to the older group then from the younger to the middle-aged group. In TTA analysis, older adults were less consistent then the other drivers in judging a vehicle approaching at 50 km/h. TTA estimated accuracy increased when the approaching vehicle travels at higher speeds. Although not significant, it was founded a U-shape relationship between age and response bias of TTA. We conclude that UFOV is much more sensitive to age effects then TTA and interventions should be designed to enhance UFOV between older drivers. The effectiveness of TTA paradigm for driving behavior analysis is also discussed.

Keywords – aging, driving, time-to-arrival, useful-field-of-view

1. Introduction

Visual Attention and Speed Perception are important abilities for safe driving through all ages [1,2]. Nevertheless, many studies that investigate age effects on driving capability frequently centre the scope of research in older adults or just compare them with young adults, omitting the middle-age drivers and consequently making difficult to understand the abilities evolution across the lifespan.

Visual function tests alone have demonstrated little sensitivity to identify risk drivers [3]. The UFOV® test [4] which combines the evaluation of the visual processing speed, selective and divided visual attention, was identified as a valid and reliable index of driving performance and safety in older adults [1,5,6]. The concept of useful field of view (UFOV) was first introduced by Sanders [7] who used the term "functional visual field" to indicate the visual field area over which information can be acquired in a brief glance without eye or head movements. Subsequently come to be most widely associated with a specific computer-based test, the UFOV® test. Evidences showed that UFOV® test performance relies on higher-order cognitive abilities as well as visual sensory function [8].