User-centred design of in-vehicle route guidance systems

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Abstract

Navigation is an attention-demanding aspect of the driving task. In-vehicle route guidance systems (RGSs) have the potential to reduce the attention demands of navigating. However, they also have the potential to distract or confuse drivers. Individuals differ in their navigational strategies and abilities. Designing in-vehicle route guidance systems that take into account these user-characteristics can improve transportation safety and efficiency. Three investigations are discussed which highlight the importance of user-centred design in developing more effective RGSs.

Introduction

Navigation is essential to many real-world tasks, such as driving. Geographic disorientation, or getting lost, is associated with a higher risk of crash involvement (Burns, 1999; Dingus, Hulse, Mollenhauer, & Fleischman, 1997; Eby & Kostyniuk, 1999; Walker, Alicandri, Sedney, & Roberts, 1990), increased traffic congestion (Burns, 1999) and extensive economical and ecological waste. Recent technological advances have led to the development of global positioning satellite (GPS) based in-vehicle route guidance systems (RGSs) that can assist people with the attentionally demanding task of navigation. However, despite their potential benefits their impact on transportation safety is currently under debate (Baldwin, 2002; Harms & Patten, 2003; Noy, 1997).

Considerable evidence indicates that individuals differ markedly in both their abilities to navigate (Choi & Silverman, 2003; Dror, Kosslyn, & Waag, 1993; Gugerty & Brooks, 2004) and in their preferred navigational strategy (Kato & Takeuchi, 2003; Lawton, 1994; Lawton & Kallai, 2002). In-vehicle RGSs designed to accommodate these individual differences will more effectively assist the driver with the navigational task, thus reducing attentional demands and distraction potential and ultimately promoting increased transportation safety and efficiency.

Towards this aim, a series of driving simulation investigations were conducted with the goal of examining the RGS parameters that are most effective in aiding individual drivers in both way-finding and route learning tasks. In each investigation the drivers' navigational preferences and strategies were examined.

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