



Landscape heritage objects' effect on driving: A combined driving simulator and questionnaire study



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ABSTRACT

According to the literature, landscape (panoramas, heritage objects e.g. landmarks) affects people in various ways. Data are primarily developed by asking people (interviews, photo sessions, focus groups) about their preferences, but to a lesser degree by measuring how the body reacts to such objects. Personal experience while driving a car through a landscape is even more rare. In this paper we study how different types of objects in the landscape affect drivers during their drive. A high-fidelity moving-base driving simulator was used to measure choice of speed and lateral position in combination with stress (heart rate measure) and eye tracking. The data were supplemented with questionnaires. Eighteen test drivers (8 men and 10 women) with a mean age of 37 were recruited. The test drivers were exposed to different new and old types of landscape objects such as 19th century church, wind turbine, 17th century milestone and bus stop, placed at different distances from the road driven. The findings are in some respect contradictory, but it was concluded that that 33% of the test drivers felt stressed during the drive. All test drivers said that they had felt calm at times during the drive but the reason for this was only to a minor degree connected with old and modern objects. The open landscape was experienced as conducive to acceleration. Most objects were, to a small degree, experienced (subjective data) as having a speed-reducing effect, much in line with the simulator data (objective data). Objects close to the road affected the drivers' choice of lateral position. No significant differences could be observed concerning the test drivers' gaze between old or modern objects, but a significant difference was observed between the test drivers' gaze between road stretches with faraway objects and stretches without objects. No meaningful, significant differences were found for the drivers' stress levels as measured by heart rate.

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1. Introduction

As of February 2013, 37 out of 47 Council of Europe member states have ratified the European Landscape Convention (Council, 2013). This means that for many European countries, landscape has become a legal issue to consider in all policy areas, transport infrastructure planning among them. Hence, cultural objects are to be considered in the context of road safety when planning and designing new roads. However, there have been few scholarly publications concerning how people experience features such as

cultural heritage objects in the landscape, and whether, and if so how, such features affect us when driving.

In the trailblazing book, *The view from the road*, Appleyard et al. (1964: 4) write that 'both [driver and passenger] are a captive audience who cannot avoid remarking, even if only subconsciously, the most dramatic events of a scene which is too mobile and too dangerous to be ignored. In both cases, vision is directed forward, a fact which provides the designer with a means of directing attention. In both cases, there is an undertone of risk [...]'. This puts the focus of attention on the driver, the subconscious, the surrounding landscape and risk, all of which are parts of this study. The present paper focuses on objects, for instance the cultural heritage components in the landscape as experienced by the driver in motion, as a basis for future improved road and landscape planning. The aim of this paper is to study how certain cultural heritage objects in a Swedish landscape affect drivers during their drive and whether this is related to traffic safety.

The literature of interest to this study can be divided in different ways, for instance landscape; preference of nature; emotional

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bonds to landscape, heritage and place; driver distraction due to features outside the vehicle; and finally, visual perception while driving. For a long time, the concept of landscape has been a major field of interest among geographers, architects and psychologists and is therefore a concept with many meanings (Jackson, 1984; Bladh, 1995; Tress and Tress, 2001; Brunheta and Voghera, 2011). The interpretation of landscape is not only aesthetic panoramas and vistas of large geographical areas but also, for instance, objects and personal experiences and feelings attached to objects and vistas.

Within environmental psychology research it is obvious that the individual's visual experiences of nature are often more appreciated than that of the built city (Kaplan and Kaplan, 1989; Velarde et al., 2007). Landscapes with a high impact of human activity, such as arable, grazing and meadows, are included in the word nature and are thus not its antithesis. The individual's physiological but also cognitive preference for different type of landscapes (or environments as the term often goes) has been measured in several studies (Kaplan and Kaplan, 1989; Ulrich et al., 1991; Parson et al., 1998). In addition to these international studies, one Scandinavian study is of interest in this context (Hägerhäll, 1999, 2001). There seems to exist a high preference for certain landscape types such as half-open pastoral landscapes or landscapes with certain objects such as Swedish-red cottages and wooden fences in a typical southern Swedish setting with small fields and semi-pastoral grasslands that cannot be explained by the evolutionary preferable environments. This means that some people are affected by certain landscape settings with objects, sometimes heritage objects.

Tuan writes that 'a homeland has its landmarks, which may be features of high visibility and public significance, such as monuments, shrines, a hallowed battlefield or cemetery. These visible signs serve to enhance people's sense of identity; they encourage awareness of and loyalty to place' (Tuan, 1977: 159). Sense of belonging, identity and attachment is a research area concerning emotional bonds between humans and landscape (place) that has occupied a variety of research disciplines (Lewicka, 2011). The field consists of both theoretical and philosophical work with no experimental data to support such bonds, while other work has tried to assess the bonds, mostly using self-report methodologies. Kaltenborn and Bjerke (2002), for instance, studied landscape preference in Norway using photographs of agricultural landscapes with modern and old building types (e.g. log house, silage silo) whose attractiveness was ranked on a seven-point scale. They found that place attachment was higher for the photos containing natural environment (cf. Ulrich, 1993) but also concerning older forms of agricultural landscapes with historical elements such as summer farms with log houses as well as the old church of Røros town. In their study, place attachment also includes e.g. identity. Stephenson (2008) interviewed New Zealanders and found that they valued the landscape's physical qualities such as gullies, trees, historic settlements and routes as well as landscape views. Also, family connections were an important underlying aspect of landscape significance. In a study covering a 10-month period, Korpela et al. (2009) showed that attachment may change over time, at least for urban places. Proxy data have also been used in studies, even if they do not afford direct insight into such emotional bonds (Lewicka, 2011). Research into emotional bonds with objects has connections with social psychology research concerning attitudes towards visual displayed objects. Roskos-Ewoldsen and Fazio (1992) have found a connection between an object that attracts a person's attention and the attitudes that the person has to that object, and have also found that these attitudes are highly accessible from memory at an early stage of the person's processing of visual information. Such attitude-evoking stimuli appear to attract attention automatically and appear not to be based on an intentional strategy. In a later review article, Fazio (2007) summarises the attitudes as, for example, being based on emotional reactions

that the object elicits or on a person's behaviours and experiences with the object or as a combination of the two. The Fazio research team maintain that the reason for a person choosing to view a certain object and not another is due to object associations based on experiences stored in memory. We argue that identity, attachment and sense of belonging are probably also based on experiences.

Objects and their relation to traffic safety are mostly researched within the field of driver distraction. This is a vast research field which has mostly focussed on in-vehicle distraction while driving, such as tuning the radio, using a mobile phone, eating and so on (Horberry and Edquist, 2009; Dukic et al., 2013). The opposite applies to features outside the car that distract drivers. Two U.S. studies show that 29% (Stutts et al., 2001) and 35% (Glaze and Ellis, 2003) respectively of drivers involved in crashes were distracted by something outside the vehicle. In another study (Stutts et al., 2005) there is a difference in vehicle events (lane wandering, vehicle encroachment, sudden braking) per hour between external no distraction (7.64%) and external distraction (15.45%). Studies on specific features outside the car that may cause driver distraction are few, but studies have been made of billboards (Horberry and Edquist, 2009; Taylor et al., in press) which caught the drivers' eyes. However, the distraction's effect on road safety is not always clear. Besides, billboard survey studies at crash scenes show that 10% of the reported distractions were looking at scenery and landmarks (Glaze and Ellis, 2003).

Some research has dwelt on the surroundings (e.g. landscape, objects, nature) as experienced from the vehicle. Edensor (2004) states that practices and representations together with the spaces that surround cultural objects are bearers of a national identity. Heritage is perceived as a form of collective memory (Peckham, 2003). The road system with its familiar road furniture (markings, crash barriers etc.) comprises vernacular features that constitute a 'sense of being in place' (Edensor, 2004: 108). He equates the American corporate logos (McDonalds, Mobil Gas etc.) of rich urban roads with English 'steeples and towers of churches. . . [with their] various regional architectural styles and historical forms. . .' (Edensor, 2004: 109) which also constitute iconic symbols. Carr and Schissler (1969) found that both car drivers who are familiar with a certain road and their passengers who are not so familiar with it, were more inclined to pay greater attention to things beside the road, such as historic places. In a study by Antonson et al. (2009) of drivers' landscape perception it was found that in an open landscape the drivers drove faster, did not drive as close to the centre of the road, and grasped the steering wheel more often while simultaneously experiencing less stress than in a semi-open landscape and forest. Using a driving simulator, Lippold et al. (2006) conducted a study of the influence of roadside vegetation on driver behaviour. Regarding speed behaviour on straight roads, no influence of side planting was determined. However, on roads with dangerous bends, plantings outside the curve had a speed-lowering effect. In a before-and-after study of road surroundings near a town in Texas, Mok et al. (2006) found that roads with landscape improvements had fewer accidents than before the improvements. Drottenborg (2002) determined that speed was lower in surroundings that the drivers found aesthetically pleasing, for example, when cherry trees along a street were blooming. Explanations such as relaxation and a desire to see nature may explain why American drivers prefer driving along parkways rather than along freeways (Parson et al., 1998). Landscape can also have a restorative effect on the mind, with reduced stress (Grahm and Stigsdotter, 2003).

Simulators have been accepted as good substitutes for on-road surveys and are used for many purposes – for example, to study drivers' impairment (Anund et al., 2008), stress (Hill and Boyle, 2007), experiences of landscape (Antonson et al., 2009), steering demand (Dijksterhuis et al., 2011) and choice of speed (Calvi et al., 2012). Nevertheless, there seem to have been very few studies that

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