

# The number of participants required in occlusion studies of in-vehicle information systems (IVIS)

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## **Abstract**

The aim of the trials conducted in this research was to address gaps in occlusion research. Twenty participants completed training trials on four In-Vehicle Information System (IVIS) tasks (1: Enter destination, 2: Place of Interest (PoI) search, 3: Change radio frequency, 4: Dial telephone) whilst wearing occlusion goggles that intermittently blocked their vision. Participants achieved a level of proficiency at which no further improvement was observed. Participants then completed three test instances of each task. Task completion times for the fastest and slowest N subjects were compared to times for all participants using independent sample t-tests. The value of N was increased sequentially until no significant difference existed between groups, thus providing an estimate of the group size required to obtain a representative sample. Results suggested that a group size of seven participants was sufficient for task 4, ten participants were required for tasks 1 and 3, and fourteen participants were required for task 2. Inferences are made about the reasons for the discrepancy in the number of subjects that are required to assess each task and recommendations are proposed for the trial protocol of studies that assess IVIS tasks using occlusion.

## **Introduction**

In-vehicle information systems (IVIS) can provide the driver with a vast array of useful information. Navigation systems, road traffic information systems, mobile telephones and in-vehicle entertainment systems are all becoming widely available to the consumer. However these secondary tasks can also distract the driver from the primary task of safely controlling the vehicle. The level of distraction imposed by an IVIS task is dependent on the visual demand of the task, the resumability of the task, and the driver's behaviour. Although it is difficult to control driver behaviour, the visual demand and resumability associated with an IVIS task can be controlled for through the system's design.

Visual occlusion has been employed since the mid-sixties (Senders et al., 1966) with the aim of understanding and modelling driver visual behaviour. It can be used to assess both the visual demand and resumability of an IVIS task and has been found to be effective in this assessment (Burns, Lansdown, and Parkes, 2004). The