Transitional information in simplified mine detection tasks

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Abstract

There are three sources of information that the military will use in its search for Improvised Explosive Devices (IEDs) and mines. Visual search is used to scan an area for signs of disturbance and metal detectors are used to scan the area for buried objects. One question that arises from this is, how is visual search supported by tools, such as metal detectors? A third source of information relates to the expectations that the searcher might have for the presence of objects. These expectations often arise from the use of 'pattern of life studies' to recognise unusual behaviour in the environment. In this paper, we consider how the integration of these different representations can create problems and how these forms of search require the development of a mental model of the environment, using different forms of representation. The paper presents simple table-top paradigm to explore the differences in representation when search is performed visually versus when it is performed using a metal-detector.

Introduction

The motivation for these experiments came from a comment made by a training officer at the UK MoD Defence Explosives Munitions Search School to the effect that novice uses of mine-detectors tended to 'follow the tool' they were using and to have a limited focus on the environment around them. This implied that the novices were constraining their search to the area in the immediate vicinity of the tip of the metal detector (or 'grudge') rather than planning their search. This point is illustrated by eye-movement recordings we made of a trainee conducting a search using both a metal detector (figure 1) and his hands (figure 2). The direction of gaze (as indicated by the centre of the cross-hair) was typically close to the point at which the hand or the 'grudge' was located, rather than scanning around the area.

Expectation and search

Further discussion with Subject Matter Experts has led to the assumption that search for explosive devices involves a combination of physical search (possibly using some form of detection equipment) coupled with knowledge of likely areas to search. The first set of knowledge concerns the 'pattern of life' surrounding a given area,