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The development and assessment of behavioural markers to support counter-IED training

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ABSTRACT

This article describes the method used to develop and test a checklist of behavioural markers designed to support UK military forces during Counter-Improvised Explosive Device (C-IED) training. IEDs represent a significant threat to UK and allied forces. Effective C-IED procedures and techniques are central to reducing risk to life in this safety critical role. Behavioural markers have been developed to characterise and assess non-technical skills which have been shown to be important in maintaining high performance in other safety critical domains.

The aims of this study were two-fold. Firstly to develop a method which could be used to capture and assess operationally relevant behavioural markers for use in C-IED training relating primarily to non-technical skills. Secondly, to test the user acceptance of the behavioural marker checklist during military training activities.

Through engagement with military subject matter experts, operationally relevant and observable behaviours seen in C-IED training have been identified and their links to stronger and weaker performance have been established. Using a card-sort technique, the content validity of each of the markers was assessed in addition to their detectability in an operational context. Following this assessment, a selection of the most operationally relevant and detectable behaviours were assimilated into a checklist and this checklist was tested in C-IED training activities.

The results of the study show that the method used was effective in generating and assessing the behavioural markers using military subject matter experts. The study also broadly supports the utility and user-acceptance of the use of behavioural markers during training activities.

The checklist developed using this methodology will provide those responsible for delivering instruction in C-IED techniques and procedures with a straightforward process for identifying good and poor performance with respect to non-technical skills. In addition it will provide a basis for the provision of focussed feedback to trainees during debrief.

1. Introduction

Improvised Explosive Devices (IEDs) have been a significant cause of fatalities for UK military forces during recent deployments in Afghanistan and Iraq and are likely to remain a threat to deployed personnel in future military operations. Since the invasion of Afghanistan in 2001, the International Security Assistance Force (ISAF) and Afghan ground forces have been fighting a continuing insurgency by the Taliban and associated paramilitary groups. Although the insurgents have engaged coalition forces directly with effective use of small arms 'fire and manoeuvre', they rely heavily on asymmetric tactics including the use of IEDs, suicide attacks and ambushes to inflict casualties and influence events (Meyerle and Malkasian, 2009).

Out of the 453 UK casualties reported due to hostile action from 2001 to July 2014, 219 (48%) have been caused by IEDs. This figure does not include non-fatal casualties, of which there were 2177 classed as Wounded in Action (Ministry of Defence, 2014). IEDs can be constructed with a low metal content to reduce the chances of detection and can be carried by vehicles, people and animals, or hidden within roads or walls. IEDs can be detonated by command wire to a hidden observer, time based or by the victim themselves

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using methods such as pressure plates. To counter the IED threat, the British Army set up a Counter-IED (C-IED) Task Force to study the Taliban's methods and improve infantry soldier's ability to identify IEDs using new procedures and equipment (Oliver, 2014). This has resulted in improved tools, techniques and procedures to reduce the risk to the soldier in this safety-critical role. Effective C-IED training is essential to prepare UK and allied forces in reducing risk from this significant threat.

This work describes an approach for the development of a checklist of behavioural markers to assess trainee performance during C-IED training. C-IED training includes IED threat awareness and instruction in the techniques and procedures required to improve protection against the threat. The behavioural marker checklist offers a simple, but effective method for identifying both good and poor performance through the characterisation of observable behaviour relating to non-technical skills which are critical for effective performance. The checklist offers those responsible for C-IED instruction an effective means to assess performance and to focus feedback to trainees during debrief.

Complex operational roles performed by professionals in safety critical domains demand appropriate knowledge of rules and procedures together with the required technical skills and techniques. The military domain shares similarities with these safety critical domains since highly skilled soldiers operate in complex, dynamic environments according to standard operating procedures. In order to maximise performance and reduce risk, these procedures demand effective Non-Technical Skills (NTS) such as communication, teamwork, situation awareness and leadership in addition to technical skills (Rutherford et al., 2012; Flin et al., 2008, 2007, 2003). Given these similarities, application of the same tools and techniques used in other safety critical environments, such as behavioural markers, have the potential to improve safety and reduce risk in the military domain.

Aviation recognised the importance of NTS early since several serious accidents had their roots in a lack of NTS. In these accidents a causal factor identified in subsequent accident reports was the behaviour and interaction of the crew on the flight deck as opposed to a specific skill based error. Examples of such accidents include the Tenerife airport disaster (McCreary et al., 1998; Weick, 1993) and Eastern Airlines Flight 401 (Chou et al., 1996). In aviation a broad range of NTS are addressed explicitly through crewresource management (CRM) training. CRM is primarily concerned with non-technical skills and behaviours focussing on cognitive and interpersonal skills as opposed to technical ‘stick and rudder’ skills (Flin et al., 2003). CRM training is now mandated both at the national level (CAA, 2006) and at the European level through the European Aviation Safety Agency (Commission Regulation (EU) No 965/2012, 2012). This reflects the importance of NTS in achieving and maintaining safety in operations in addition to effective technical skills. Indeed the concept of CRM has been explicitly applied to other safety critical domains (for example see Shields and Flin, 2013; O'Connor and Flin, 2003).

The application of more general NTS training and measurement has since been expanded to include other safety critical domains such as energy (for example Crichton and Flin, 2004; O'Connor and Flin, 2003) and medicine (for example Flin et al., 2010). Evaluation of the effect of NTS training and development has shown a positive impact on safety (Fisher et al., 2000) indicating that such non-technical skills should be given as much attention as technical skills in order to ensure high performance and safety.

Behavioural markers have been successfully used in a variety of safety critical applications to assess and improve performance. Applications include aviation, medicine, energy and the military. Aviation has been a major area in which behavioural markers have been applied. Behavioural markers to assess non-technical skills have been developed in order to assess the quality of Crew Resource Management (CRM) in the cockpit (Flin and Martin, 2001). Effective CRM is reliant on good communication and attitudes, the outputs of which can often result in specifiable behaviours (Murray and Maurino, 2010; Kanki et al., 2010). As such these behaviours can be traced from a CRM training programme, codified and measured to provide an assessment of the quality of CRM in the cockpit. Flin and Martin review a number of behavioural marker systems in use by airlines to assess pilots' CRM skills. They conclude that both UK and international airlines intend to use behavioural markers in the future to integrate the assessment of technical and non-technical skills.

The medical domain has also attracted research into behavioural markers, especially relating to non-technical skills in surgery (Mitchell et al., 2013; Shields and Flin, 2013; Mitchell et al., 2012; Yule et al., 2006; Fletcher et al., 2004; Carthey et al., 2003), emergency medicine and intensive care (Haerkens et al., 2012; Thomas et al., 2004) and anaesthesia (Rutherford et al., 2012; Flin et al., 2010; Fletcher et al., 2004). These studies have shown that behavioural markers are an effective way of evaluating non-technical behaviours which relate to task performance. In the military domain, Fautua et al. (2010) successfully used behavioural markers to measure performance of US border patrol personnel as part of a larger study.

Behavioural markers are descriptions of observable behaviours of teams or individuals, not attitudes or personality traits (Flin and Martin, 2001). Effective behavioural markers are clear concepts which are described simply and relate to task performance. The behaviour can be measured as a frequency (the absence or presence of the marker) or on a scale. Simple three-point scales (for example observed, not observed, not applicable) are often used on behavioural marker checklists in order to improve the clarity of the concept and to ensure reliability between different assessors (for example see Fletcher et al., 2001).

Well-designed behavioural markers have good reliability since they are based on directly observable behaviour. Good reliability has been empirically demonstrated following the development of such checklists in aviation (Klampfer et al., 2001) and medicine (Mitchell et al., 2012; Yule et al., 2008). Well-designed behavioural markers also have strong face-validity since the behaviours identified are demonstrably related to task performance. This is an advantage since it allows effective, specific feedback to be given in a timely manner. Behavioural markers can also be used as a feed-forward tool to provide guidance to participants regarding the behaviours they are expected to exhibit in order to perform well. The most effective checklists are short, often less than one page and since the markers are defined in domain-specific language, they are straightforward to learn and have been shown to achieve good user acceptance (Flin and Martin, 2001). Long questionnaire based methods of assessment or note taking can suffer from poor user acceptance due to the high workload required to make judgements and fill in the questionnaires in a training environment (Rowley, 2014). In addition, questionnaire based methods can also require extensive post-processing of data delaying the provision of feedback. Inter-rater reliability can also be problematic unless very comprehensive training is given to instructors.

The aims of this study were two-fold. Firstly to develop a method which could be used to capture and assess operationally relevant behavioural markers for use in C-IED training. Secondly, to test the user acceptance of the behavioural marker checklist assessment method during military training activities.

To address these aims a methodology which has been successfully used to generate and assess behavioural markers associated with C-IED task performance is reported. Two checklists have been constructed as a result of these activities: a long-form checklist