

ACCELERATING PROFESSIONAL JUDGEMENT & DECISION MAKING EXPERTISE: FEEDBACK AND SCENARIO-BASED TRAINING IN CRIME SCENE EXAMINATION

Dr Amanda Martindale
Human Performance Science
University of Edinburgh
E-mail: amanda.martindale@ed.ac.uk

Prof Dave Collins
Institute of Coaching and Performance
University of Central Lancashire
E-mail: djcollins@uclan.ac.uk



THE UNIVERSITY
of EDINBURGH



Summary: This report highlights the crucial role of Scene Examination within the Forensic Services offered by the Scottish Police Authority, and the importance of Professional Judgement and Decision Making expertise within a skilled workforce. The use of Applied Cognitive Task Analysis allowed for illumination and provision of feedback on the thought processes of experienced Scene Examiners, including detailed observable information about actions taken, situation assessment, and use of critical cues. This information could have a range of operational uses, and be a valuable addition to existing training. A scenario-based training tool was also devised to provide exemplar responses to a complex and serious crime scene scenario from Scene Examiners in the East, West and North regions of Scotland. This is an exemplar of the type of training tools that could be generated as part of a wider expertise-based training environment. Implicit findings indicated the potential to move training towards a more adaptive expertise base, with consequent gains for the quality of service, together with a more flexible and adaptable workforce. Once developed and established, this Community of Practice approach would effectively support human performance in these incredibly high stakes environments, and be cost neutral to the organisation.

INTRODUCTION

Scene Examination is a crucial part of the Forensic Services offered by the Scottish Police Authority (SPA) in the provision of an integrated 'crime scene through to court' approach, and the importance of skilled Scene Examiners "cannot be underestimated" (SPA, 2015). Scene Examiners (SEs) meticulously search the crime scene and record and recover forensic evidence which can ultimately be used to prove or disprove if a crime has occurred. These high stakes environments typically comprise of stressful field conditions, ill-defined and competing goals, conditions of uncertainty, and time pressured decision making (Ross, Shafer & Klein, 2006).

Given the inherent complexities of crime scenes, and the huge amount of visual information potentially available, the Professional Judgement and Decision Making (PJDM) expertise of SEs is of the utmost importance to the successful delivery of this service. PJDM offers insight into how practitioners think in action. Service delivery is a series of judgements and decisions and SEs are required to process vast amounts of information, to be able to think on micro and macro levels (often at the same time) and to rapidly formulate and enact coherent plans of action (Martindale & Collins, 2012). The development of PJDM expertise has been studied in several high performance domains (e.g., psychological support, elite sport and coaching; Martindale & Collins, 2013) and is readily applicable to parallel domains of human performance. Indeed, as SEs develop

this expertise, so their cognitive development, knowledge structures, and reasoning processes become more sophisticated and enhanced (Hoffman, 1996). Yet, these processes are by their very nature 'covert' - making them very difficult to 'see' and therefore to understand and train in novice and developing practitioners.

Previous work exploring PJDM expertise in Scene Examination has attempted to 'make thinking visible' by accessing and capturing the thought processes of experienced SEs (Martindale, 2013). This initial work involved the use of Applied Cognitive Task Analysis (ACTA, Militello & Hutton, 1998) to understand the cognitive task demands of SEs and to identify the key cognitive elements required to perform proficiently. This meta-method comprises of three techniques (task diagram, knowledge audit, and simulation scenario) which complement each other, but which also tap into different elements of cognitive skill (McAndrew & Gore, 2013). The method therefore offers a unique window on the thought processes and PJDM of Scene Examiners, and transforms covert thinking into detailed observable information about actions taken, situation assessment, and the use of critical cues.

In pursuit of these positive goals, the aims of this current project were to provide individual feedback to SEs involved in the initial pilot work exploring PJDM expertise in Scene Examination (which was funded by a University of Edinburgh KE grant) and to develop a simulation scenario training tool as a means of accessing and documenting expert knowledge in Scene Examination.

To meet these aims, the main questions this project addressed were: 'What are the benefits and limitations of individual feedback on ACTA?' and 'How can expert knowledge accessed via a simulation scenario be packaged to facilitate ongoing professional learning?'

The following objectives were designed to meet these project aims and questions:

1. Provide feedback on individual Cognitive Demands Tables (previously devised using the ACTA methodology);
2. Assess and report on the benefits and limitations of accessing expert cognition in this way (via interviews with SEs);
3. Synthesise responses to a complex simulation scenario (previously collected via ACTA) to form exemplar responses from individuals in the East, West and North regions of Scotland for use as a training tool.

These phases of work were designed to establish 'cognitive authenticity' (emulation of the features an expert would perceive in the performance environment that support perception and decision making; Ross & Pierce, 2000) within the Scene Examination profession and therefore contribute to sustainability for the future in terms of retaining expert knowledge and training PJDM expertise within the Scene Examination workforce.

MAJOR FINDINGS TO DATE

The provision of individual feedback to SEs involved the presentation, read-through, and verification of each stage of the ACTA protocol (task diagram, knowledge audit, and simulation scenario) as well as the resulting Cognitive Demands Table, which consolidated and synthesized the data obtained during each stage. In particular, SEs were asked about the 'completeness' and 'accuracy' of the information throughout each stage and were actively encouraged to highlight anything which was missing or incorrect. As well as the provision of feedback on how SEs cognitive processes had been captured and represented, this process allowed for a thorough checking and verification of the data obtained. As a result, the data provided us with a sound representation of SEs knowledge, including difficult job elements, strategies used for effective performance, and potential errors that a novice might make.

Following the provision of feedback and data verification process, SEs were asked to report on the perceived benefits and limitations of accessing expert cognition in this way. Raw data quotations were qualitatively analysed using inductive analysis to build up a series of lower order and higher order themes. A summary of these findings is provided below:

Overview of Benefits:

- *Effectiveness of ACTA tools in generating useful information:*
 - Encourages reflection
 - Knowledge elicitation
 - Potential benefits for training
 - Useful addition to SOPs
 - Potential to assess change
 - Concise description of the job
- *Potential uses for information generated using ACTA:*
 - Useful initial training and ongoing training tool
 - Potential assessment tool
 - Provision/exchange of vicarious knowledge
 - Useful in developing a National model for major incidents
 - Useful to explain Scene Examination to new police officers
 - Useful for senior management
- *Valuable addition to existing training:*
 - Useful in combination with existing training
 - More concise way of reflecting on/progressing through scenarios of increasing difficulty
 - Could be used to elicit thought processes
 - Could be useful for CPD/ developing communities of practice

Overview of Limitations:

- *Limitations of knowledge elicitation tools:*
 - Low numbers of participants
 - Difficulty generating examples 'on the spot'
 - Uncertainty over whether responses were what was needed
 - Every scene/scenario is different – always going to be challenges not come across before
 - Inherent time constraints on explaining all aspects of the job
 - Could only be an addition to doing the job
- *Combination of volume and serious crime:*
 - Mixture of volume and serious crime in Cognitive Demands Table
 - Different strategic approaches to volume and serious crime
 - May be more helpful to trainees to see volume and serious crime separately
- *Realism/scope of scenarios:*
 - Difficulty with thinking on your feet
 - Second-guessing in simulation scenario what others have already done
 - Wouldn't be assessing cold – you would have much more information

In summary, these explicit findings suggest that knowledge elicitation tools such as ACTA are effective in generating useful information about the cognitive processes required for effective Scene Examination performance, which could have a range of operational uses and be a valuable addition to existing training. The overview of limitations suggests that participants had some internal reservations about what was 'required' or 'expected' from this process which is indicative of implicit findings about the Scene Examination culture (see Implicit Findings and Interpretation below).

Simulation Scenarios: A Future Training Method

The simulation scenarios utilised as part of the ACTA protocol were designed with support from the Forensic Services Scottish Multimedia Unit and included photographic stills and panoramas of a complex and major incident. The scenario included briefing notes and developed over time to incorporate four separate but related scenes of crime (first deposition site, deceased's home address, second deposition site, suspect's home address).

SEs responses to the simulation scenario (including actions, situation assessment, critical cues, and potential errors someone less experienced may make) were synthesised to form exemplar responses from individuals in the East, West and North regions of Scotland. These products of the ACTA method highlight potentially important regional differences in the effectiveness of the approach to the examination of a scene by SEs and

provide an exemplar of the type of training tools that could be generated as part of a wider expertise-based training environment (Alison et al., 2013; see section on Future Work).

Implicit Findings and Interpretation:

Several implicit findings emerge from the data, additional to the explicit and generally positive perceptions reported earlier. For example, the potential to move training towards a more adaptive expertise base, with consequent gains for the quality of service emerged as a consistent if implicit theme. The current culture within Scene Examination appears to be overly geared towards 'competent' practice. This is characterised by the prevalence of SOPs as markers of 'quality' and the use of competency-based assessment in order for SEs to reach a baseline (competent) level of service provision. Some of the responses generated by participants reflect this culture (e.g. difficulty in 'thinking on the spot' and being 'unsure' if responses were 'correct') suggest that perceptions of 'what is expected' are procedurally based.

In contrast, further responses from participants in this study suggest some inherent drivers (indeed desire) for the Scene Examination culture to be expertise-based. This would be characterised by ongoing training and development opportunities for SEs (largely embedded within practice rather than bolt-on 'top-up' courses), plus the development and enhancement of practice through a 'Community of Practice' approach. Professional learning systems and structures that would allow SEs to share experiences and explore the 'shades of grey' inherent in practice would relieve some of the competency-based constraints and make for a more flexible and adaptable workforce. Recent positive exemplars of this approach are apparent from a wide variety of professional domains, including nursing, military and elite refereeing (e.g., Collins et al., 2015).

In fact, some of the responses from participants *explicitly* highlighted the need for an expertise-based culture. For example, difficulty in articulating knowledge would suggest the need for a common vocabulary, which is an essential precursor to realising the benefits of a Community of Practice approach. Participants reported that every scene/scenario is different and that there will always be challenges that SEs may not have come across before; this complex environment highlights the need for adaptive expertise over competent practice.

Given the current financial and other resource constraints which impose on Scene Examination, we should stress that, once developed and established; these practices would be cost neutral.

FUTURE WORK

Future work in this area will necessarily start with increasing the size of the 'expert knowledge pool' (i.e., increase numbers of SE Supervisors taking part in the ACTA process). This would provide a more complete picture of the 'expert' knowledge base from which to design training and instruction. Feedback from SEs supports research and literature in this area that Cognitive Task Analysis approaches often provide measurably greater quantities of useful information about how to perform tasks at a highly proficient level than other methods such as observation alone or self-generated explanations (Tofel-Grehel & Feldon, 2013).

Following this, or perhaps independently, a longer-term project to design and embed an expertise-based culture and training environment within Scene Examination could take place. This would include the use of scenario-based training, reflective training, team training, feedback and debriefing, and mentoring systems. These systems and structures designed specifically for use in Scene Examination (and delivered in-house by staff) are able to effectively support human performance in these incredibly high stakes environments. The implementation of this 'community of practice' would be most effectively delivered with inbuilt pre-, mid- and post-measures to allow for the assessment of impact. A research design using cohort-select (Supervisors) and multiple baselines (by region) would allow for the evaluation of efficacy alongside the development of these new (cost-neutral) systems.

SOURCES OF FURTHER INFORMATION

Alison L, van den Heuvel C, Waring S, Power N, Long A, O'Hara T & Crego J, 2013. Immersive simulated learning environment for researching critical incidents: a knowledge synthesis of literature and experiences of studying high-risk strategic decision making. *Journal of Cognitive Engineering and Decision Making* 7, 255-72.

Collins D, Burke V, Martindale A, Cruickshank A, 2015. The illusion of competency versus the desirability of expertise: seeking a common standard for support professions in sport. *Sports Medicine* 45, 1–7.

Hoffman RR, 1996. How can expertise be defined? Implications of research from cognitive psychology. In: Williams R, Faulkner W, Fleck J. eds. *Exploring Expertise*. Edinburgh, Scotland: University of Edinburgh Press, 81–100.

Martindale A, 2013. Exploring professional judgement and decision making expertise in scene examination. Cognitive Demands Table (Overview) East, West & North of Scotland. A report prepared for the Scottish Police Authority Forensic Services by the University of Edinburgh.

Martindale A, Collins D, 2012. A professional judgment and decision making case study: reflection-in-action research [Special issue]. *The Sport Psychologist* 26, 500-18.

Martindale A, Collins D, 2013. The development of professional judgment and decision making expertise in applied sport psychology. *The Sport Psychologist* 27, 390–98.

McAndrew C, Gore J, 2013. Understanding preferences in experience-based choice: a study of cognition in the “wild”. *Journal of Cognitive Engineering and Decision Making* 7, 179-97.

Militello LG, Hutton RJB, 1998. Applied cognitive task analysis (ACTA): a practitioner’s toolkit for understanding cognitive task demands. *Ergonomics* 41, 1618– 41.

Ross KG, Pierce LG, 2000. Cognitive engineering of training for adaptive battlefield thinking. In IEA 14th Triennial Congress and HFES 44th Annual Meeting (Vol. 2, pp. 410-413). Santa Monica, CA: Human Factors.

Ross KG, Shafer JL, Klein G, 2006. Professional judgments and naturalistic decision making. In Ericsson KA, Charness N, Hoffman RR, Feltovich PJ. eds. *The Cambridge Handbook of Expertise and Expert Performance*. Cambridge University Press, 403-20.

Scottish Police Authority, 2015. Scene Examination. Retrieved from: <http://www.spa.police.uk/forensic-services/150843/> on 1st February 2015.

Tofel-Grehel C, Feldon DF, 2013. Cognitive task analysis-based training: a meta-analysis of studies. *Journal of Cognitive Engineering and Decision Making* 7, 293-304.