

For the final paper, see Wyatt, D. (2014) 'Practising Crime Scene Investigation: Trace and contamination in routine work' *Policing and Society* 24(4) 443-458. DOI: <http://dx.doi.org/10.1080/10439463.2013.868460>.

Practising Crime Scene Investigation: Trace and contamination in routine work

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The Crime Scene Investigator (CSI) has a distinct professional profile within the police. It is the CSI who is tasked with identifying trace at crime scenes in order to inform police investigations. Despite this significant role, little is known sociologically about the CSI's routine work. This paper draws on ethnographic fieldwork completed at the National Policing Improvement Agency's Forensic Centre, observation of CSIs at real crime scenes and interview data to consider the CSI's practices surrounding trace at volume crime scenes. It foregrounds the work that take place in transforming crime scene trace into admissible evidence or objects for laboratory analysis and the processes of identifying meaningful trace, central to CSI claims of unique expertise. Yet beyond the crime scene and police environment, it is the CSI's ability to record their adherence to prescriptive contamination avoidance procedures which is of paramount importance. This paper demonstrates the agency involved in making sense of crime scenes and the differing ways the CSI and CSI work are understood across police and courtroom environments.

Keywords: contact trace material; contamination, crime scene investigation; forensic practice

Introduction

The application of forensic science in policing is now commonplace and has received much academic attention. In their recent article, Williams and Weetman provide a 'conceptual reminder' of the need to consider forensic science as something that is "enacted" at specific sites – at the crime scene, in the laboratory, in the briefing room, in interviews and in the court' (2013, p.381). In doing so, they highlight the complex combinations of institutional structures, dynamic processes and agents in the routine use of forensic science in police work. In this article I focus on one of the key actors in this enactment, the Crime Scene Investigator (CSI).

The CSI is generally a civilian¹ and is present in each of the self-governing police forces in England and Wales. Although their job titles and the minutiae of job descriptions vary, CSI roles are normally very similar, particularly in terms of the “scientific” character of their working methods’ (Williams 2007, p.195). Given their ubiquitous presence and plethora of popular media depictions of the CSI and CSI work, it surprising that, to date, there has been limited study of the everyday work of the CSI in general and their role at the crime scene in particular (Williams (2007) is a notable exception). Some commentators acknowledge the significance of the crime scene and crime scene examination in the everyday use of forensics in police investigative practice (Horswell 1995; Horswell & Edwards 1997; Ribaux, Baylon, Roux, et al. 2010; Kelty et al. 2011; Julian et al. 2012), but focus has remained on more general themes such as the key attributes of top CSIs (Kelty et al. 2011; Kelty 2011), the scientific nature of CSI work (Millen 2000; Harrison 2006) and perceptions of the CSI role (Ludwig et al. 2012). Although such studies provide important data in relation to the macro aspects of the CSI role, their focus on overarching issues does not allow consideration of the routine enactment of CSI work.

Wider sociological literature on forensic technologies often ignores the CSI all together and, instead, focuses on the police use of forensic science in terms of the development, implementation and governance of DNA technologies and police DNA databases (Williams & Johnson 2008; Hindmarsh & Prainsack 2010), the effects of the privatisation of forensic science provision (Lawless 2011) and the negotiation of forensic/scientific expertise in the courtroom, paying particular attention to the

¹ ‘Civilian’ is used here to distinguish from sworn police officers, those who have ‘legal powers of arrest and control of the public given to him or her directly by a sworn oath and warrant’ (Police Federation of England and Wales 2008, p.7).

fingerprint examiner (Cole 2001; Cole 2005) and the laboratory based forensic scientist (Halfon 1998; Jasanoff 1998; Lynch 2002; Lynch et al. 2008). Even literature which aims to assess the contribution forensic science makes in the investigation of crime falls short of its goal. Williams and Weetman (2013) identify a number of reasons for this. These include the reductionism of the extant studies which view police and forensic processes as linear and ‘have provided little sense of how forensic science support is enacted in the course of investigations’ (Williams & Weetman 2013, p.378). Therefore, the existing work does not acknowledge satisfactorily the agency and expertise of actors in the heterogeneous usage of forensic science in investigative practices. This paper aims to advance a better understanding of CSI practices. Trace and contamination avoidance are used to illustrate some of the complexities of routine CSI work and, in particular, the way this work straddles the investigative and the courtroom arenas with each environment operationalising different understandings of the CSI’s expertise and role.

Trace evidence generally ‘refer[s] to minute physical evidence that may be transferred from a victim or crime scene, or vice versa’ (Nickell & Fischer 1998, p.54). ‘Trace’ can be used to denote a number of different types of material including glass fragments and fibres but also bloodstains and fingerprints. Two types of trace, fingerprints and DNA samples, can be very valuable as evidence and are the only forms of trace CSIs view as being able to ‘give a name’, i.e. identify a specific individual as a potential suspect. Trace often has utility as evidence in the courtroom, but it may also benefit an investigation when it helps define a pool of potential suspects or provide a direction for further police investigation. It may provide useful information that enables the police force to analyse and possibly link together crimes. In all police forces in England and Wales it is the CSI who selects, collects and records relevant trace items at

volume crime scenes, some of which may later be analysed in forensic laboratories and used as evidence in court.

The term 'routine' is used throughout this paper to denote both the mundane, everyday aspects of CSI practice and a focus on volume crime scenes. Volume crime scene examinations comprise the majority of a CSI's work. For Ribaux, Baylon, Lock, et al. (2010, p.67) volume crime scene practices are less formalised and prescribed than at serious and major crime scenes and involve 'a greater variety of, often tacit, strategies and practices'. Although it is questionable whether the mundane work of CSIs differs between serious and major crime on the one hand, and volume crime on the other hand, the organisation of scene examinations and number of actors involved varies between these two classifications of crime. Whereas at serious and major crimes there could be numerous CSIs working within the same scene under the direction of a Crime Scene Manager or Crime Scene Co-ordinator in conjunction with the Senior Investigating Officer, at volume crime scenes the CSI is usually alone. Although they draw on information provided to them by other police personnel and the police officers investigating the crime, the CSI appears to make more autonomous decisions about the required action at volume crime scenes. Volume crime scene examinations take place within tighter budgetary and resource limits than those of major crime and this can affect whether a CSI attends a crime scene at all, the time available to examine the scene, what is collected and which of the forensic objects removed from the crime scene, if any, are submitted for laboratory analysis (Green 2007; Williams & Johnson 2007; Tilley & Townsley 2009). Therefore, although this focus on volume crime may have lesser implications for the examination of serious and major crime scenes, it does highlight the significant role played by the CSI as an autonomous agent at volume crime scenes, particularly in terms of meaningful trace identification practices. Furthermore,

as the discussion of contamination avoidance practices aims to show, the practices used in documenting contamination avoidance and maintaining the admissibility of evidence have a clear relevance across all crime types.

Drawing on data collected from ethnographic fieldwork at the National Policing Improvement Agency's Forensic Centre, the main training site for CSIs in England and Wales, in interviews with trainee CSIs and through observation at crime scenes, I consider the training, perceptions and routine practices of the CSI in relation to trace and contamination. Using Williams (2007) as a starting point, I argue that trace identification and contamination avoidance are two key sites where expertise is actively negotiated by CSIs and achieved in two different ways. Often limited for time, the CSI draws on trained knowledge, experience and interactions with victims and witnesses to identify potentially meaningful trace. Although the maxim of CSI work, 'every contact leaves a trace', commonly referred to as Locard's law, is taught as fact, seen as absolute and reiterated throughout their training, routine CSI work involves successfully distinguishing the potentially meaningful, crime-related trace on a site from all trace present and transforming the former into scientifically and legally acceptable objects, i.e. the 'forensic artefacts' (Williams 2007). As I aim to illustrate below, this process is central to the CSI's role and participants' understandings of their unique expertise within the police force.

For the CSI, adherence to contamination avoidance protocol is seen as second nature. Yet in the courtroom, claims of potential contamination are a threat to the CSI's expertise and the forensic artefacts they produce. In this environment, the administrative practices surrounding the production of forensic artefacts are most significant in protecting the validity of these artefacts and the CSI's expertise. Using the concept of 'administrative objectivity' as defined by Lynch et al. (2008), I argue that

specific contamination avoidance practices and the perceived absence of administrative errors enable the competent CSI to blackbox their activity and safeguard the forensic artefact from courtroom questioning.

This paper aims to show the CSI as an active and reflexive agent in crime scene sense-making processes. It highlights the significance of a clearer understanding of routine CSI work in any assessment of the value added by forensic science to police work where the crime scene rather than the laboratory or courtroom is the starting point. By considering these grassroots level practices and how CSIs actively engage with the parameters of their role in their routine work, this paper presents crime scene investigation as a more decisive and complex activity than the ‘bagging and tagging’ of trace. CSI everyday work reflects and executes institutional imperatives and enables and constrains the effective use of forensic techniques in the investigation of crime. Even as the CSI and the products of their routine work move into the courtroom environment where strict adherence to protocol is of paramount importance over the autonomy and expertise attributed to the CSI at the crime scene, the CSI actively engages with these moving parameters and differing understandings of their role.

Edmond Locard, Trace and the Forensic Artefact

In police and forensic circles, trace and the potential it offers in criminal investigations are generally associated with the French forensic scientist, Edmond Locard, whose work is often summarised by the statement ‘every contact leaves a trace’. Although there is no evidence to suggest Locard made this categorical statement (Williams 2007, p.200), ‘every contact leaves a trace’ is referred to as Locard’s exchange principle or Locard’s law. In this form and often unquestioned, Locard’s law also appears in academic literature and crime scene investigation training manuals.

Although less definitive about the universal power of trace as an investigative tool, Locard does highlight the potential of information obtained from trace identified and collected at a crime scene. In his most detailed discussion of trace (referred to as ‘dust’) (i.e. Locard 1930a; Locard 1930b; Locard & Larson 1930), Locard provides a number of examples of the uses and practical considerations relevant when utilising dust as intelligence or evidence in criminal investigations. Offering numerous lists of possible reasons for the presence of certain types of dust in particular environments (for example, dust associated with certain occupations) he demonstrates that the likelihood of dust being meaningful in a criminal investigation relates to three factors: the rarity of the dust; the location of the dust; and the relationship between the dust and the other knowledge held by the police. By documenting these wider issues, Locard takes us beyond the notion that every item of dust is equally meaningful. Instead, he helps to foreground the skill and sense-making required to identify potentially meaningful sources of dust within specific crime scene contexts and stresses the importance of competently identifying the relevant trace from all the trace present at crime scenes.

Although dust has disappeared from the police lexicon, the use of Locard’s work through ‘every contact leaves a trace’ is seen by Williams (2007) as part of two propositions which provide the role of the CSI with institutional validity. It is through these propositions, i.e. ‘exchange always occurs’ and ‘individuation is always possible’, that ‘competent crime scene examination is completed’ (Williams 2007, p.199; 195). The first statement relates to Locard’s law through the notion of exchange. The second appears as a pillar of forensic science in general. Both, however, remain scientifically unproven yet are significant in guiding practices and justifying the CSI’s control over the crime scene space. Williams suggests that these two propositions are embedded in the processes of collecting, packaging and recording items removed from the scene for

forensic analysis and/or use as evidence. In this sense, ‘forensic artefacts’ are the items taken away from crime scenes. They are ‘deliberately created objects of attention and analysis, [...] treated by those who encounter them later in the narrative of any particular criminal investigation as the equivalent of, or stand-ins for, the real-world objects from which these artefacts were constructed’ (Williams 2007, p.204). The term ‘forensic artefact’ makes a clear distinction between trace and trace that is transformed into potentially meaningful, institutionally, scientifically and legally acceptable objects. It also encapsulates the practices involved in their creation and directs attention to the importance of CSI action and sense making at a crime scene.

In routine work, CSIs use a variety of terms when talking about trace: most often ‘trace’ (in the singular for both singular and plural), or ‘contact trace material’. Others separate out potential DNA sources and fingerprint marks from other types of trace. Items collected, packaged and recorded from a crime scene are generally referred to as ‘exhibits’, ‘evidence’ or by more specific names relating to the item (for example, ‘swabs’ is common for DNA and ‘lifts’ is the norm for fingerprints or footwear marks). Given the diversity of terminology, I will use ‘trace’ in this paper to refer to all types of trace and ‘forensic artefacts’ for trace which is collected, packaged, recorded and removed from crime scene for scientific analysis and/or potential use as evidence.

Methodology

In contrast to research which has focused on more overarching issues of using science in the investigation of crime, for example DNA databasing (Williams & Johnson 2008; Hindmarsh & Prainsack 2010), or taken a more macro-oriented view of the CSI or CSI work (for example, Millen 2000; Harrison 2006; Kelty et al. 2011; Kelty 2011; Ludwig et al. 2012), this study considers forensic processes from the bottom up by exploring the micro-dimensions of practice. Concentrating on the mundane aspects

of the CSI's everyday work enables a better understanding of how abstract processes are enacted at a grassroots level while also providing a site in which to explore the interesting and overlooked significance of routine work beyond more sensationalised cases. To obtain a more textured understanding of the required knowledge, its enactment in practice as well as the everyday reality of being a CSI in England and Wales, this research utilised ethnographic data obtained from three weeks' fieldwork at the National Policing Improvement Agency's Forensic Centre, now the College of Policing's Forensic Centre, located near Durham in the UK. This purpose-built centre is the main site of CSI training in England and Wales.² Completed in 2011, I observed across the two training programmes (Module 1 and Module 2) that form the core classroom training of CSIs. I concentrated on the everyday practices, the parameters of the role and the skills deemed necessary to be a CSI in the police forces of England and Wales. This also gave me access to the trainers who were well equipped to articulate some of the more tacit aspects of CSI work and the development of CSI expertise. Observing the classroom and scenario training received by CSIs enabled a clear understanding of what is deemed the institutionally sanctioned knowledge necessary in the examination of crime scenes.

Observation at the Forensic Centre was coupled with in-depth semi structured interviews with ten participants (five from each training programme) on their experiences as CSIs both in and outside of the Forensic Centre, their occupational backgrounds, typical working practices, the problems they encounter and understandings of their position within the police force. I completed a second interview

² Although the Metropolitan (Met) police force have their own training centre, scientific support unit training (including that of the CSI) across the Met and Durham sites are 'becoming increasingly harmonised, the aim being to develop a consistent national approach' (Fraser 2007, p.390).

with eight of these interviewees six to nine months later. To place the experiences captured in the interviews and at the Forensic Centre into the wider context of everyday life in a busy police department, I also spent one day a week for five weeks shadowing a number of CSIs in a Crime Scene Investigation department in southern England. These days started at 8am when the observed CSI arrived for their shift and finished when the CSI left for the day (officially at 4pm although on all observed days the CSI stayed between fifteen minutes to two hours longer). The number of volume crime scenes attended on these days varied from two to six. The majority of crimes attended were either theft from motor vehicle or household burglary offences. At these scenes, I carried equipment and helped the CSI in any way I could. The time spent travelling between crime scenes provided space to discuss the crime scene we had just visited and their experiences of being a CSI and doing CSI work.

Interviews were transcribed and this data along with training hand outs and observation data was open coded and thematically analysed (Miles & Huberman 1994). Following initial coding, themes and subthemes were identified, codes consolidated and analysis focused on the ways in which participants and trainers make sense of practices, the themes and examples participants draw on in their interviews and interactions as well as the factors used to describe and justify crime scene practices. Where quoted below, participants' accounts refer to the most saturated themes in relation to trace and contamination avoidance and their associated routine practices.

Participants are identified in the following discussion with numbers. 01 to 05 were initially interviewed during their Module 1 course (required to attend volume crime scenes) although all had previous experience within the police force, some within a Crime Scene Investigation department. 06 to 10 were first interviewed during their

Module 2 course (required to attend serious and major crime scenes) and therefore had experience of completing the Module 1 course and examining volume crime scenes.

In the sections that follow I first consider trace as it is introduced to trainees at the Forensic Centre and in participants' accounts of practice, highlighting the significance of trace for their perception of the CSI's unique expertise and position within the investigative process. I then examine contamination avoidance practices and their central place in the courtroom examination of forensic artefacts, displaying that this environment operationalises a very different representation of CSI work and CSI expertise.

Trace at the NPIA Forensic Centre

The Module 1 training programme devoted substantial time to developing the necessary theoretical knowledge and practical skills to successfully collect, package and record trace. Whether dusting and lifting a powdered fingerprint or taping objects to collect fibres, participants were expected to be meticulous in their execution of the trace collection protocols. Proficiency was developed over time and the training was organised so the different procedures and skills required to collect and package specific types of trace were built up gradually and simultaneously with the investigative capacities to evaluate the evidentiary potential of trace. Participants completed scenario scene examinations, the interrogation and the recording of carefully prepared physical environments representing crime scenes. In these scenarios they were not only required to think about the process of correct collection and packaging of trace, but to place the trace's potential meaning within the context of the specific scene under examination. Classroom lessons concentrated on the forensic artefact production process. Although there was one lesson on the factors that may mean trace is more or less valuable, the skills and knowledge required to identify potentially meaningful sources of trace within

specific scene contexts were acquired through practice. Trainees completed scenario scenes at the Forensic Centre to hone these skills which they continued to develop when they returned to their respective police forces and attended crime scenes under the supervision of a mentor.

Trace and the practices of trace collection were framed in the training within the confines of Locard's law, understood as meaning that any contact whatsoever will result in the transfer of matter between two or more objects. 'Every contact leaves a trace' was used to stress two points: the potential information ascertainable from trace in the investigation of crime and how sensitive trace is to contamination. Contamination appeared as the logical corollary of Locard's law and, for this reason, its definition during the training programme was not discussed.

After the initial course administration and health and safety training, one of the first lessons entitled 'Basic Forensic Principles' required Module 1 trainees to complete hypothetical exercises. They were provided with a crime scene description and asked to identify any contamination issues and items of trace they would collect. Beyond wearing the appropriate protective clothing and being mindful of their movements in the crime scene, the message of the exercises was that trace collection and contamination avoidance is a threefold process of correctly collecting, packaging and signing and sealing the packaging. In doing so, the training programme explicitly acknowledges that trace potential and contamination aversion need to be considered together and as part of an interlinked process of preservation within the wider practices of accurate trace identification and careful forensic artefact production.

With the constant presence of Locard's law and numerous lessons on the correct way to create forensic artefacts from a variety of different types of trace, it is

unsurprising that participants saw the practices of identifying, collecting and packaging trace (forensic artefact production) as key to their expertise.

CSIs should have the most knowledge about evidence recovery, how to package evidence and how to store it. We've had the most in-depth training, so we should be experts in that sort of area. (05)

However, as she continues, this knowledge is not just about packaging and evidence recovery, but making sense of trace and its potential utility in a police investigation, particularly in terms of explaining this utility to the investigating police officers:

[Police Officers] don't always understand how the evidence that you collect is either going to help their investigation or ultimately not help their investigation. A lot of officers have got an idea that if you find somebody's fingerprints on something that means that person must have been in that particular house. They don't appreciate the fact that if it's a moveable item, that doesn't necessarily place somebody within a house and they can get very excited that we've found fingerprints but when you [...] start talking to them about the implications of what you've [...] found, it's not actually that crucial piece of evidence that they've been looking for so, it's just basically... giving them their reality check sometimes. [...A]gain, with members of the public they don't always understand what you're collecting or why you're collecting it and how that's actually going to slot into the whole investigation process so you [have to] give them a bit of an idea of whether we've got a chance of catching anybody or not. (05)

The training and practical experiences of the CSI are seen above as enabling them to differentiate potentially meaningful trace from those which the wider police force and members of the public may wrongly believe are important. In this account, it is a fingerprint on an item that could have been moved into the scene. Although a fingerprint may appear high up on lay hierarchies of evidence, if the fingerprint is on an item that could have reasonably been moved into the crime scene, it may only be of little evidential value (although potentially useful as intelligence). Similarly, items

which may not appear relevant to the police officer or victim may be of significant value. Above, the CSI performs the ‘reality check’, a role which consistently appeared across interviews and in interactions at crime scenes and is used as a narrative demonstration of professional expertise.

Participant 07 was less willing to talk of her ‘expertise’. She saw herself as the ‘middle man, collecting things and submitting them on [...] to the experts.’ However, she also emphasised her ability to understand what she referred to as the ‘realistic chance of evidence being valuable.’ She continues:

A police officer had gone down to the car scene and picked up three cigarette butts off the floor outside the car and then asked me to examine them for forensics. I could see where they were coming from, you can get DNA from cigarette ends but they don’t think about the realistic forensic potential in terms of the Crown Prosecution Service. You’ve got a cigarette end with DNA on but at the end of the day all that proves is that somebody’s had a cigarette next to the car. (07).

Both the interviewees quoted above and other participants stressed the CSI’s ability to see the ‘bigger picture’, to be able to consider potential sources of forensic information from the perspective of their investigative and courtroom value. This also suggests a more textured enactment of Locard’s work, beyond Locard’s law. Although no participant questioned the value or validity of ‘every contact leaves a trace’, and some used this statement as a taken for granted explanation of practice, the CSIs were only interested in the trace most likely to be meaningful in an investigation. One of the key ways CSIs made distinctions about the potential meaningfulness of trace was based on the information they were able to obtain from victims and witnesses about the crime. Millen (2000) suggests that interactional and communication skills are key to the CSI role and this was particularly apparent when observing at actual crime scenes and in interview accounts:

I think you could teach anybody to powder for fingerprints. Anybody could pick up a brush, stick a bit of powder on the window and fingerprint and recover it. That aspect of the job isn't difficult. It's the other aspects -the communication side and the thought processes, thinking like an offender. [..T]he victim can tell you so much about what's been moved in their homes and stuff like that [...] you also start and learn how offenders think within the house. (08)

Participant 08 articulates more clearly where she believes the CSI's skills lie. The packaging and production of forensic artefacts per se 'isn't difficult'. It is this communication side and thought process which involves skill. By asking the right questions, focusing on the more practical side (for example, 'what has been moved, has anyone else touched this since you realised a crime had taken place?') CSIs were able to obtain forensically useful information. Both this 'thinking like an offender' and ability to successfully obtain forensically useful information from victims and witnesses appear significant in the way that CSIs make sense of crimes and crime scenes, allowing them to crudely classify trace into meaningful/meaningless categories. Positioning this dividing line removes ambiguity and provides direction for action. By drawing on their classroom training, experience of examining scenes and the contextual knowledge of the scene possessed by witnesses and victims, the CSI reframes lay accounts within the confines of a forensically-oriented and crime-specific scene examination in order to identify the relevant trace and create forensic artefacts.

My field observations and interviews with the more experienced participants, in particular, emphasised the interactional practices in wider discussions of completing their role within the time pressures of routine CSI work. The practical constraints of CSI work at volume crime scenes, such as unpredictable workflow and travelling times to each crime scene, limited time to exam each scene and administrative burdens, are present in my participants' narratives. CSIs must make quick decisions about which trace should be recovered from a scene and these decisions were aided by the

information ascertained from victims and witnesses. In the observed training and in interview accounts a number of key areas for consideration were raised such as examining the perceived points of entry and exit and looking for fingerprints, obvious DNA (generally in the form of blood) and footwear marks. However beyond these generic aspects and local police force guidelines, all participants emphasised the importance of their judgment in the selection and production of forensic artefacts, over and above official force guidelines. Such an emphasis displays participants as active agents in making sense of the crime scene, defining the potentially meaningful from the meaningless and producing the forensic artefacts that they would take away from the scene and be used in the investigation of the crime.

Williams (2004; 2008), building on Fraser (2000), considers the integration of Scientific Support Units (SSU) in general and the CSI in particular into the police investigative process. He presents two types of integration, structural and procedural. Structural integration sees the CSI as a ‘technical assistant’ in the investigation of crime, where CSIs are under the direct control of their seniors and the expertise they are attributed is limited. Although technically competent at collecting evidence they are outside of the police investigative process. Procedural integration sees the CSI as an ‘expert collaborator’ and ‘acknowledges the distinctive knowledge-based expertise of CSEs and related SSU staff’³ (Williams 2004, p.22). Williams states that ‘the type and degree of control’ the CSI can ‘exercise over their own work and the degree to which SSU staff are able to influence the actions of other stakeholders’ are particularly important in differentiating between the two types of integration (2004, pp.22–23). Procedural integration acknowledges and highlights the integration of the CSI into the

³ Crime Scene Examiner (CSE) is the title used in some forces for the CSI.

wider investigative process, influencing and advising the associated police officers. In procedural integration, the CSI is seen as a ‘reflective practitioner’ (Williams 2004, p.24).

Participants’ accounts above clearly stress their involvement with the wider police force in the investigation of crime beyond the identification of trace at crime scenes. This vision of CSI work as procedurally integrated into police investigative practice clearly reflects the way the CSI role and trace practices are framed in the Forensic Centre training programme itself. Similarly, interviewees’ accounts present routine trace practices as solidly integrated into wider police investigations. They provide advice to police officers and situate trace within their investigative contexts, identifying what they perceive meaningful and only transforming this into forensic artefacts. As such, meaningful trace identification and forensic artefact production are central in their claims to unique expertise and the perception of their utility in the investigative process. Contamination avoidance, however, introduced at the Forensic Centre in conjunction with trace, does not appear to be attributed with the same level of significance in crime scene work.

Contamination and the Forensic Artefact

The Forensic Centre introduced the possibility of contamination as a logical corollary of ‘every contact leaves a trace’, stressing the need for contamination avoidance practices to be carefully considered at each crime scene. However, whereas interviewees saw forensic artefact production as providing a site in which to demonstrate their unique expertise, contamination and contamination avoidance was simply engrained in their practices:

[W]hen I started, I had to think about every single thing I did whereas now I just automatically, as soon as I get out of the van, put on a pair of gloves [...] You stop touching things with your hands and use your elbows. You look at where you're walking [...] you get into the habit of doing things which means you don't have to actually think about them so it makes the job a little easier [...] Contamination avoidance definitely does become second nature. (03)

For this participant, contamination is understood as something negative that must be avoided. Whereas during training contamination needed to be consciously considered at all times, all my participants reported how contamination avoidance has since become 'second nature'. However, what contamination means and how it can be avoided depends on the specific kind of trace, the material of interest, at a scene:

[F]ingerprinting you can mess it up and lose it all whereas DNA you got a wet swab or whatever and you know you're going to get a decent sample as long as you don't contaminate it. If you imagine fingerprinting a murder weapon or something and it's there and all of a sudden you've smudged it. (01)

Whereas the contamination of fingerprints may be visually apparent, contamination of DNA samples may only be identified when the forensic artefact reaches the laboratory. Participant 01 provides a representative account of the CSI's view of contamination as something that occurs only *in the production* of forensic artefacts. Thus, in everyday work, contamination avoidance relates to the strict adherence to forensic artefact production protocol at specific scenes, as taught at the Forensic Centre. However, the unpredictable nature of crime scene work and stretched resources discussed above can mean it is not always realistic to follow contamination avoidance protocol beyond the individual scene setting, causing problems when two or more crime scenes appear to relate to the same perpetrator:

I think the major one that we come across is when we've got more than one scene for one office, like if you've got a car in a recovery garage and you've got the

burglary it came from. We're very aware that one person can't do both and when it comes to major incidents it's very obvious that our seniors are deciding who is on what shift and who could work, who could cover one particular scene and keep other people in place for perhaps people in custody. But as a day-to-day issue, you know, I've done jobs in the past where it's obvious it's the same people over night. Obvious, screamingly obvious, that's the same group of people going from one car to another but at the end of the day I can't prove that and I can't say that from the word go until I've been to that scene even though it's screamingly obvious. There's only me on cover in that area so it would be so stupid for me to ring up another area and say would you mind driving for an hour to do a theft from motor vehicle because I can't do all three because of contamination issues. You've just got to be a bit smart and say that you've been careful about your evidence collection, your note writing and that's the only real issue really. (09).

Participant 09 highlights how her seniors would have enforced the best practice guideline of using different CSIs in different vans to examining potentially related serious or major crime scenes. Yet adherence to this imperative at volume crime scenes is not always realistic. Although participant 09 acknowledges the potential for cross contamination of one or more crime scenes, in this situation problems can be averted through the careful production and recording of forensic artefacts, making sure to document contamination avoidance practices.

While not questioning the validity of these contamination avoidance practices, this particular example highlights the significance of using administrative records, both external to (such as scene examination reports) and intrinsic to (such as tamper-evidence bag text) forensic artefact production to help remove questions of potential contamination and demonstrate the robustness of the resulting artefacts. This appeared most vividly when participants had their first experience of being formally questioned in the courtroom setting. In a role-play scenario with their instructors and external legal professionals acting as defence and prosecution lawyers, participants were alerted to numerous contamination issues. Similar questions were asked by the lawyers to each of

the participants and the mistakes identified in their work all centred around forensic artefacts. These errors ranged from the incorrect numbering of forensic artefacts to inconsistencies in the recorded time a forensic artefact was created and all related to the administrative practices of completing the tamper-evidence bag text. What was significant, however, was the way these errors were framed in defence accounts; simple administrative errors were used to make claims of incompetence and such incompetence was regarded as emblematic of potential contamination, undermining the forensic artefacts the CSI had produced. As such, these simple administrative practices, when consistently and meticulously completed, were central in demonstrating the validity of the forensic artefacts the participant produced and, by extension, their competence as a CSI. Unlike at the crime scene where meaningful trace identification and forensic artefact production illustrate how CSIs can actively negotiate expertise, the courtroom was a setting in which their practices were judged against a strict and rigid framework of acceptable and unacceptable action. Yet, most significantly, rather than contamination as the sully of a sample, identified either at the scene or in the laboratory analysis of the forensic artefact, contamination as operationalised in the courtroom setting incorporates the entire forensic artefact production process. As such, the courtroom scenarios clearly demonstrated the significance of these administrative processes intrinsic to forensic artefact production.

Considering chains of custody, Lynch et al. (2008) examine the significance of administrative practices in the admissibility of courtroom evidence. They discuss a case where the documentation used to record the movements of samples between police force and laboratory was put under scrutiny: a photocopied signature on one of these documents led to courtroom questioning of whether the resulting sample analysis was admissible. On further inspection it became apparent that the image presented by the

paper trail only registered a selection of the actors and processes through which the item had passed. Lynch et al. use the term ‘administrative objectivity’ here to denote the way the administrative processes ‘stood for (that is stood proxy for) a more complicated set of organisational agents, operations and records’ (2008, p.135). Had this error not been identified, the numerous processes that took place would have been masked by the correctly completed log of sample movements. Lynch et al. (2008) concentrated on the wider administrative processes involved in the production of objective and admissible evidence. Yet by focusing solely on the paperwork surrounding the recorded movements of objects, the administration, integral to forensic artefact production, is inadvertently blackboxed. At this local level of forensic artefact production, the account provided by participant 09 above demonstrates the significance of these administrative practices at an early stage in a criminal investigation. The CSI may avoid potential contamination as best they can through their actions at the scene and in the forensic artefact production process. However, without meticulously completing forensic artefact production paperwork and scene examination reporting, CSIs would be unable to demonstrate their actions were legally and scientifically acceptable. In these processes, the mundane, administrative practices involved in forensic artefact production at volume scenes are crucial in demonstrating (unless proven otherwise) that contamination has been successfully avoided and, by extension, that the forensic artefact is a valid object of both scientific analysis and courtroom evidence. The Forensic Centre scenario highlights how administrative objectivity may provide a pertinent conceptual framework to understand the bureaucratic processes surrounding routine CSI work when it enters the courtroom. Furthermore, when this example is considered in relation to Lynch et al’s (2008) case, it further supports the significant role of administration in the production of admissible forensic evidence.

Whereas at the crime scene and within the police setting participants' perceptions of their role, trace identification practices and forensic artefact production processes put forward an image of the CSI as an expert collaborator, when the CSI is taken outside of this context and enters the courtroom they appear to be treated as 'technical assistants'. Williams (2004) acknowledges that his typology of structural and procedural integration is a deliberate simplification and leaves room for CSIs to occupy a space somewhere in the middle, leaning towards one type of integration or the other. Yet, following the CSI from the crime scene to the courtroom, or from inside to outside the police force, demonstrates how this perceived integration into the wider investigative process is not uniformly understood across different occupational arenas. The CSI may be attributed with expertise and appear integrated into wider police investigative processes but in the courtroom setting it is their ability to meticulously record practices and complete scene documentation which is of greatest importance.

Discussion

My findings highlight the need for a greater attention to the complex processes that take place at the crime scene and in the routine work of the CSI. Although the focus of this paper has been on volume crime, it is clear that a consideration of the effects of CSI work on police investigations and the way this work and its products (forensic artefacts) are understood within the investigative and legal environments is important across all crime types. This paper has provided the early steps in accounting for some of the multifaceted processes involved in identifying and packaging trace at crime scenes and protecting trace from actual and potential (claims of) contamination. The above account of CSI work shows that crime scene practices involve a range of decisions and interactions where CSIs are far more than 'forensic dustmen' (Wayment 1982). A deeper understanding of how forensic science is enacted in the investigation of crime,

specifically including crime scene practices, would meaningfully contribute to an assessment of the value added by forensic techniques to police investigations more widely, as discussed by Williams and Weetman (2013). The account provided above documents the interplay between autonomous decision making and process work in trace practices and as trace moves between the investigative (police) and courtroom environments.

Locard's law may provide the institutional validity for the CSI's role in contemporary policing (Williams 2007), but it is not used as a means of foregrounding the mundane, ubiquitous trace that surrounds us all. Instead, participants saw their ability to identify meaningful trace and transform it into forensic artefacts as the esoteric knowledge that delimits the CSI's expertise from wider police and lay personnel. By drawing on all the information they obtain from the scene and relevant parties, their experience and expertise, CSIs are able to make quick decisions about the likely relevance of different trace identified at crime scenes.

Bearing in mind the wider institutional pressures mentioned earlier, the methods of identifying meaningful trace helps the CSI to meet institutional expectations and competently complete their role. As such, although Locard's law is treated as fact, the everyday practices of handling and recording trace display a more textured enactment of Locard's work. Participants consider the context of a particular trace and its potential utility and meaning for a police investigation and then, where necessary, produce a forensic artefact. They advise wider police personnel on the utility of specific forensic artefacts, their potential courtroom value and provide the reality check when the evidential significance of these artefacts is misconstrued. Within these processes, the CSI appears as an active, reflexive agent, making sense of crime scenes, deciding whether or not trace is potentially significant at this very early stage in the investigation,

often omitted from existing studies. Although Ludwig et al. report a notable 38% of their participants saw the CSI role as ‘exclusively that of an evidence collector’ (2012, p.58), my participants and the training programme itself instilled a perception of their role which fits into Williams’ (2004) notion of ‘expert collaborators’, procedurally integrated into the investigative process and as a unique resource in the routine deployment of science in the investigation of crime.

Once potentially relevant trace has been identified, the process of producing a forensic artefact from this material is prescriptive with strict contamination avoidance protocols. If completed correctly, forensic artefact production process can help safeguard the object’s validity as courtroom evidence. Yet, any minor mistakes in the production of the forensic artefacts, particularly in the administration that is intrinsic to forensic artefact production, are understood as emblematic of potential contamination. The mention of contamination in the courtroom environment, whether found or not, undermines the expertise of the CSI and the validity of the forensic artefact. Whereas at the crime scene/in the police environment they are autonomous decision makers, playing an active role in the investigative process, in the courtroom the CSI appears more structurally integrated into the investigative process as a ‘technical assistant’. Yet within the forensic artefact production process, the CSI seems fully aware of the consequences of poor contamination avoidance records and actively engage in a process of documenting their adherence to protocol. This active engagement with courtroom requirements and careful negotiation between these two spheres was characteristic in more experienced participants’ narratives. Nevertheless, it appears that although structural and procedural integration are useful in understanding the position of the CSI within the investigative process, they do not account for the potentially different ways

CSI work, expertise and integration are understood in other occupational arenas, such as the courtroom.

Lynch et al. use the term 'administrative objectivity' to conceptualise the chain of custody and its significance in the 'practical construction and deconstruction of forensic evidence' (2008, p.114). Administrative objectivity, however, also has clear relevance at the crime scene. The administrative processes that take place in routine scene examinations and, in particular, in forensic artefact production are equally important in producing robust and admissible evidence. When these administrative processes are completed successfully, accounts suggest that they serve not only to blackbox the process of producing these objects but can help safeguard the object's courtroom validity. Paperwork practices also enable and disable claims of potential forensic artefact contamination and, by extension, help protect or undermine a CSI's competence. Administrative objectivity, extended to incorporate crime scene investigation and to conceptualise the work involved in forensic artefact production, highlights a coherent narrative in the bureaucratic processes surrounding the production of admissible evidence. In such a narrative and in the absence of any discernible errors, administrative records, including those produced at the crime scene by the CSI, mask the complexity and potentially problematic nature of the processes they document. As such, this raises questions about the production of forensic artefacts across all crime types and the power of correct record keeping in the construction of admissibility.

CSIs actively engage with their role, traverse institutional and legal requirements in trace identification and forensic artefact production to delimit their expertise and occupational jurisdiction. Yet within their routine work, they straddle two arenas where differing perceptions of their role appear, namely the police force and the courtroom. This raises interesting questions about the nature of CSI work and the attribution of

expertise within different sites. These variations are significant in the way we conceptual the professional profile of the CSI and how we understand CSI practices in the courtroom and other relevant arenas, such as the laboratory, not discussed here. CSI work has ramifications for the investigative value of forensic material as well as its laboratory analysis and courtroom admissibility, and the absence of the CSI and crime scene from the majority of existing research represents a significance oversight. It is hoped that the present discussion has provided some of the early steps in a systematic consideration of CSI work by highlighting the gulf between the attribution of expertise in meaningful trace identification and contamination avoidance practices, the significance of administrative practices in the production of admissible evidence at the crime scene and the differing understandings of the nature of CSI work across police and courtroom environments. However, further research on crime scene work is necessary to embed the CSI into sociological accounts of police forensic practice.

Acknowledgements

I am grateful to Christine Hauskeller, Dana Wilson-Kovacs and Robin Williams for their very helpful comments on earlier drafts of this paper and to my participants and staff at the College of Policing's Forensic Centre for making this research possible. I also thank the two anonymous reviewers for their clear and constructive criticism. This work was supported by the Economic and Social Research Council [grant number ES/I009019/10] and Egenis, the Centre for the Study of Life Sciences, at the University of Exeter.

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