

VU Research Portal

Forensic Crime Scene Investigator Perspectives

van der Kemp, Jasper; Deten, C.H.H.

published in

Property Crime
2020

DOI (link to publisher)

[10.4324/9781315208237-9](https://doi.org/10.4324/9781315208237-9)

document version

Early version, also known as pre-print

document license

Article 25fa Dutch Copyright Act

[Link to publication in VU Research Portal](#)

citation for published version (APA)

van der Kemp, J., & Deten, C. H. H. (2020). Forensic Crime Scene Investigator Perspectives. In A. Burrell, & M. Tonkin (Eds.), *Property Crime: Criminological and Psychological Perspectives* (pp. 133-147). Routledge.
<https://doi.org/10.4324/9781315208237-9>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

Forensic Crime Scene Investigator Perspectives

Jasper J. van der Kemp and Sharon C.H.H. Deten

Introduction

In the early 1900s there was still just a small role to play for forensics at the crime scene (De Poot, 2011). Police investigations were focussed on statements of victims or witnesses instead of the 'silent witnesses' that are traces at a crime scene. With the development of sciences like chemistry and physics the interest in those 'silent witnesses' at the crime scene grew. Those first scientists that became involved in police investigations to assess the meaning of traces were basically the first criminalists. Although being scientists they were broadly involved in crime scene investigations (De Poot, 2011). They collected traces at the scene, analysed those in their laboratories and wrote reports to aid the police in their investigations. This slowly evolved into the more specialized field of forensic science where the scientists became the laboratory analysts and the crime scene investigation was conducted by specialised police officers. Enter the crime scene investigative officer.

One of the main components of investigating property crimes is the crime scene investigation. A crime scene investigation is conducted once a crime has been reported and crime scene investigators are deployed to investigate the scene. In conducting the crime scene investigation crime scene investigators make a lot of decisions. In this chapter we will outline these decisions and describe how they are influenced by factors at the macro, meso and micro level. We aim to create awareness to the fact that psychological aspects of decision making also are of importance in understanding crime scene investigations by crime scene investigators. The main questions to be addressed in this chapter will be how is forensic evidence found, selected, and collected and what are the factors that influence those processes. As the process of crime scene investigation actually starts before the crime scene investigator has arrived at the scene, we will start from there. Not only are factors of influence on decision making found within the crime scene investigator, also procedural and even organisational factors are of importance. In describing the decision making process in the way we take a different approach than those who have more specifically described psychological bias factors related to forensic examination and analyses (see Kassin et al., 2013; Forensic Science Regulator, 2015). Although it is clear general psychological biases can come into play in crime scene examination as well, we think the decision making process of crime scene investigators cannot be understood well enough if the entire crime scene investigative process is not taken into account.

Although many might have an idea of the work of crime scene investigators and their forensic scientific approach to a crime scene, it might be surprising that crime scene investigators are quite influenced by psychological phenomena. We take the perspective that crime scene investigation is much more a decision making than strictly a forensic scientific process. As such crime scene investigators will be influenced by common psychological phenomena, such as confirmation bias and selective attention in their decision making.

Crime scene investigations are focused on the collection of forensic evidence. With improving technology to find, collect, preserve, and analyse forensic evidence, one can imagine this will not only influence practical procedures but also decision making at the crime scene. We will describe the crime scene investigative process from the decision making perspective. First we will describe some general decision issues in crime scene investigation before going into more detail about the different phases of an investigation. After that overview we will change our perspective to make clear which factors influence decision making. By differentiating those factors in different levels – micro, meso, and macro – we hope to make clear the complexity of understanding (and describing) decision making in crime scene investigations. This process is largely the same, irrespective of crime type, but throughout the chapter we will highlight issues specific to the investigation of property crime.

Decision making issues in crime scene investigations

To introduce the complexity of forensic decision making we will start with an example. Consider the crime scene of a burglary. A residential dwelling with signs of forced entry on a window. The window is open. It has been lifted and vague marks are visible. Those marks could be finger prints. Now the crime scene investigator has to decide how to handle these marks. With improved technology it is now possible to distil DNA from minute samples of biological traces, so the investigator may choose to sample the marks in the hope of finding such traces. The taking of a small sample for DNA-analyses must now be done before dusting the fingerprint in order to analyse it and hopefully find a match to a suspect. If dusting of the fingerprint is done beforehand the DNA could be contaminated with the dusting powder, so the crime scene investigator has to decide on the spot which technical procedure he will follow when the trace has been found. The decision made will be influenced by factors on macro, meso, and micro levels. On the macro level, for instance, police organisational factors play a role, such as the cost of analysing traces which might mean that only a small proportion of traces gathered can be submitted for analysis. The crime scene investigator might therefore be influenced to be more selective in collecting traces. At the meso level, which we define as the level of the crime scene investigator, the influencing factors are common from characteristics of the specific crime scene investigator. His/her knowledge of the modus operandi of burglars for instance might help interpret the marks as either being potentially from the perpetrator and being useful for the further investigation, or not. This knowledge about common modus operandi can differ from crime scene investigator to crime scene investigator as their experience will be different. Their experience will be different as they will have examined different burglaries for example. And those different burglaries can have rather different modus operandi as a result of the crimes being committed at different locations, on different targets and by different offenders.

At the micro level, the level of this specific crime scene, the crime scene investigator might interpret the marks as not being relevant due to the fact that many windows have similar marks and the fact that small children live in the house who could quite easily have left the marks. So, even looking at a single mark at burglary from a decision making perspective makes clear the number of factors at play. But as this example shows it begins with finding a piece of forensic evidence.

When evidence is found at the scene the next phase is that of the selection of evidence to be collected. Crime scene investigators generally have to be selective in the amount of forensic evidence they collect because it is simply not possible to collect all available traces (e.g. just think of all the finger prints that you would find in a home, or the biological traces such as hairs). The selection the crime scene investigator has to make is clearly a decision making process, with these decisions influenced by the interpretation of the trace in light of the assumed scenario of the crime. So of all the traces that the crime scene investigator has seen he or she will only select those that are interpreted as related to the crime. In a robbery for instance not all finger prints in the store will be collected for further analysis. The crime scene investigator will select those that fit with an assumed crime scenario of where the offender touched something. The assumption the crime scene investigator makes about how the crime was carried out by the offender is part of the crime scenario (Van der Kemp and Van Koppen, 2017) and will therefore influence the selection of traces.

We stated that one of the decision making factors is the amount of forensic evidence to be taken from a crime scene. Although this may strike one as a bit odd – why not take everything that might be of relevance – a number of factors are influencing that decision. On the policy or organisational level, procedural guidelines might determine how many pieces of evidence can be analysed by a police forensic laboratory. At a more specific level, the collection of evidence will be influenced by practical issues relating to the crime scene and the crime scene investigators. One only needs to imagine the difference between an outdoor crime scene on a rainy, windy day and that of an indoor crime scene. At the most specific level, forensic evidence collection is influenced by the crime scene investigator him- or herself. Personal factors such as experience, type of training, and even personal preferences might influence the collection of forensic evidence. These levels are shown schematically in Figure 9.1.



Figure 1. Schematic overview the of macro, meso, and micro levels influencing the forensic decision. (based on Deten, 2016)

Before we describe the specific elements at each level that might influence decision making it is useful to first identify the stages in a crime scene investigation. The next paragraphs will describe these stages, starting before the crime scene investigator enters the scene, up to the last stage of closing the investigation.

Crime scene investigation of property crimes; before arriving at the scene

The first psychological influence in the decision making process of a crime scene investigator gets introduced before the crime scene investigator sets foot on the crime scene. The information the crime scene investigator gets when briefed on the crime is already creating a bias for his later decisions. Imagine that a burglary gets reported with the information from the victim that the backdoor was forced. The crime scene investigator who examines this burglary will now be focussed on potential traces of the burglar on and around the backdoor. That of course makes sense as this is the information reported by the victim. But if the information is incorrect the crime scene investigator is likely to find traces and decide that these are crime related even though they may not be. This is a bias based on what the crime scene investigator expects to find given the prior information s/he has received (Van den Eeden and De Gruijter, 2017). This expectancy bias can also influence further decisions made by the crime scene investigator in the next phases.

Crime scene investigation at the crime scene

At the crime scene decisions have to be made on the collection of evidence. The crime scene investigator will select traces that will help the investigation answering the 5WH questions. Does evidence at the crime scene tell us something about When the crime occurred? Is there an indication of Where the crime happened? What specifically happened? Who might be involved and Why? And are there traces that help reconstruct How the crime occurred? Answering those questions should aid the police investigation by making it possible to weigh different scenarios (Van Koppen, 2011).

Traces left at the crime scene are an aid when making scenarios of the crime (De Poot, 2011). For example, blood at a crime scene of a burglary can be interpreted as coming from the burglar who cut himself while gaining access. In this scenario the blood, and more specially its location and pattern will be useful for understanding how the burglary was most likely committed. But before the traces can accurately be interpreted two main questions arise: at the source level of the trace, what is the trace exactly and can it be attributed to either the victim or the perpetrator? And secondly, at the activity level, how can the trace be explained by a crime-related activity?

Understanding traces at the activity level is most important for the police investigation, Broeders (2003) suggests. It is at that level that the difference is made if a trace is crime-related or not. As Broeders (2003, page 302) states: "It's not: 'Whose DNA is it?' but 'How did it get there?'".

At this point it might be useful to make clear that interpreting crime scene traces at both source and activity level is a decision making process and as such is prone to general psychological processes, such as bias. And those decisions are part of a bigger process than just making

decisions about a particular trace. The entire crime scene investigation is about deciding what might be relevant. As Miller (2005) states the important elements of a crime scene investigation are: “To recognize, preserve, collect, interpret, and reconstruct all the relevant physical evidence at a crime scene” (p. 168).

To make this clear we will describe the different phases of the crime scene investigation to highlight the decision making process at those phases (shown in Figure 9.2).



Figure 2. The four phases of the crime scene investigation at the crime scene.

The orientation phase

Amelsoort, Groenendal and Van Manen (2004) describe the first phase at the crime scene as the orientation phase. The crime scene investigator makes preliminary hypotheses about the crime scenario. These hypotheses are generated on the basis of the information the crime scene investigator got when he or she was sent to the crime scene and the first impression of the crime scene. At this part of the crime investigation the decision making process of the crime scene investigator is already biased towards just a select number of crime scenarios (Van den Eeden & De Grujter, 2017). Consider a crime scene investigator who is sent to a crime scene that is said to be a burglary. At the crime scene the crime scene investigator assesses the scene and decides whether the traces match a particular burglary scenario. Either the perpetrator has entered the house while using specific tools to open a door or a window quite stealthily or there might be a sign of forced entry. So, in this phase, two psychological aspects are at play. Following Miller (2005), the first element is recognizing the traces. Recognizing traces at a crime scene both relates to actually seeing the traces, or being aware that at certain locations traces might be located. Those traces, for instance, latent finger prints can only be made visible after a forensic procedure has been used (in this case dusting with forensic finger print powder for example). But next to being able to see or recognize traces the crime scene investigator must also have the forensic technical knowledge to know how invisible traces might be made visible (Jacobs, Bruinsma, Van Poppel & Moors, 2005). In this first orientation phase we already have an interaction of psychological decision making processes, that of recognizing traces and that of interpreting them in a given scenario.

The interpretation of recognized traces at a crime scene leads to the next element Miller (2005) describes; the relevance of the physical traces. One can understand that in a commercial burglary of a store, for example, a lot of traces can be found. The crime scene investigator has to decide which traces are relevant to either reconstruct the crime and/or identify potential suspects. Traces that might lead to the identification of suspects are of course very important for the further police investigation. Deciding on the relevance of traces is not always straightforward (De Poot, 2011). The crime scene investigator has to consider the likelihood of

the traces being able to identify the perpetrator. Studies by Mapes (2012) show that biological traces on different surfaces have rather different chances of producing useful DNA profiles. This is again the knowledge we referred to before that a crime scene investigator must have to make decisions at the crime scene. Next to the quality of the trace for further examination, the crime scene investigator has to consider the possibility of contamination. A trace can be contaminated in a number of ways, e.g. deliberately by the offender to elude identification or by accident as an innocent bystander touches a surface with latent finger prints or steps on a shoe print at the crime scene, or conditions such as the weather can influence the trace. At this stage of the crime scene investigation not a single trace is collected and yet we already see a number of decisions the crime scene investigator has to make that are important to recognize in order to understand the validity and usefulness of the crime scene investigation. We just described decisions in the orientation phase and those decisions will clearly have an impact on the next phases.

The preparation phase

In the preparation phase a plan of action is made to examine the crime scene in more detail and to collect evidence. This part is vital as now the main decisions are made on which traces are selected as being crime related and of importance to be forensically analysed. The crime scene investigator also now has to decide how the traces are going to be collected; with what forensic method. Again this is vital in the investigation because, for instance, if latent finger prints are made visible with finger print dust this might contaminate the biological traces of that finger print for later DNA-analysis. So the key decision parts in this phase are that of the selection of evidence and the matter of collecting them in a certain way and sequence. The selection will be based on how relevant a trace is seen by the crime scene investigator given the scenario that is being investigated (De Gruijter, 2017). Let us go back to the example of a store burglary. In this case the offender broke a window to gain access to the store. In the store a pattern of blood stains is visible. So the assumption by the crime scene investigator could be that the offender cut himself while climbing in through the broken window. In that scenario it makes sense to collect some of the blood for further analysis. But if the traces are a bit further from the window and the crime scene investigator does not think the blood stains are from the offender they will not be selected and collected. The crime scene investigator in this phase decides whether or not to take the blood. The state of the blood stains, i.e. are they relatively fresh or dried, will have an impact on the manner of collecting the blood. And the crime scene investigator will decide from which stains a sample will be taken, as generally not all the blood at a crime scene will be collected. Obviously the decision steps we just described have to be taken for each different type of forensic trace.

The execution phase

The execution phase is the actual collection of the evidence. Generally in this phase the prior decisions as to which traces need to be collected are being followed. In this phase the crime scene investigator can divert from the prepared procedure if at close inspection a trace seems to need either a different procedure or shows signs of contamination. The use of forensic techniques might also influence decisions at this point. To give an example; crime scene

investigators can use a forensically advanced method called ParaDNA (Dawnay et al., 2014). This is a presumptive test to see if a trace contains enough human DNA to extract a full DNA profile from the trace, thereby allowing it to be used for DNA identification. This test can be done at the crime scene and gives results within 75 minutes. If the result of this test shows the selected trace does not contain enough DNA the crime scene investigator might decide to select another trace for collection. Another somewhat related technique is the RapidHit 200 Human DNA Identification System, which is capable of extracting a useful DNA-profile from a trace within 90 minutes (Cangano, Elliot, Anoruo, Gass, & Buscaino, 2013). If the crime scene investigator has this system at hand we can assume this might influence the selection process of traces. Traces the crime scene investigator assumes are crime related and might identify the perpetrator will likely be selected to be used in this on the spot analysis. As a general rule we can safely assume the development of new techniques that make analysis on the crime scene possible will influence the selection and collection decision process.

The closing phase

The closing phase of the crime scene investigation follows the execution phase (Amelsvoort, Groenendal & Van Manen, 2004). At that moment the crime scene investigator should have another look at the crime scene, almost like a second orientation phase, to make certain all relevant traces were selected and collected. In this phase we can assume very few decisions as the selection and collection is already dealt with. Only if a trace is spotted that was not seen in the orientation or execution phase the crime scene investigator might decide to collect that trace. Given the fact that the prior phases were conducted on the assumption of a specific crime scenario it is more likely no new traces are seen or if they are seen are selected (De Gruijter, 2017).

After finishing the crime scene investigation the phase of analysing the selected traces comes in the police investigation. In that phase usually another selection is made as to which traces are analysed in a forensic laboratory. We will not go into detail on forensic laboratory analysis but briefly turn back to an aspect of the crime scene investigation that will influence the selection of evidence to be analysed. And that is the topic of crime relatedness of a trace. Determining if a particular trace is crime related is of course very important for the police investigation. Selecting and collecting a trace that is deemed crime related but in fact is not can lead to investigative efforts based on the wrong interpretation of that trace. In the worst case it can lead to a suspect-led investigation and potentially even a wrongful conviction (see for example Van Dobben et al., 2018). In determining crime relatedness the trace in a crime scenario must be interpreted. For instance a shoe print in the garden of a burgled house fits the scenario that the perpetrator observed the house prior to breaking in. If tool marks are on the window close to that shoe print, there is even further support for the notion that the burglar observed the house prior to breaking in. As such, trace and tool marks can be quite relevant to understand the actions of the crime (Jacobs, Bruinsma, Van Poppel & Moors, 2005).

Also, note that crime relatedness is only partly about the type of trace, but also how well it fits with an explanation – a crime scenario – of why the trace is there. Biological traces from which DNA can be extracted can be very valuable from an investigative point of view, as they can

help to identify suspects, but a crime scene investigator must consider how the trace came on the crime scene (e.g. was it left by the perpetrator during the commission of the crime (in which case the trace is crime-related) or was it, for example, walked on to the crime scene (in which case it is not crime-related)?

Crime scene investigation; influences on decisions at the micro, meso, and macro level

In the previous paragraphs the different phases of the crime scene investigation were described, highlighting the decision to be made in each phase. In this paragraph we take another look at the crime scene investigator decision making process, but now describe the influencing factors. We distinguish different levels – the crime, the crime scene investigator, and the police organisation - where these factors originate from.

Micro level: The crime scene

Each crime scene can be said to be unique. That means there will always be differences between the crime scenes and therefore the crime scene investigation. Every burglary is a burglary, but every house is different. If not on the outside, than at least on the inside as a general rule it is safe to assume all houses are decorated differently. As Miller (2005) states: “The only thing consistent about crime scenes is their inconsistency” (p.167).

Although at every crime scene traces are likely to be found these traces will be different on each crime. The type of forensic trace can differ which will lead to different decisions about the manner of collecting them. We can distinguish - in broad categories - biological traces, dactyloscopic traces, digital traces and impression traces. Although biological traces as bodily fluids, hairs or contact traces can be used very well to identify someone, it is not always clear if those traces are crime related (Meulenbroek, 2008). Next to the issue of deciding if a trace is crime related is the issue of the quality of the trace. Not all biological traces yield enough material to create a DNA profile for instance (Kloosterman & Meulenbroek, 2008).

The quality of a trace not only refers to the fact whether it can be used for further analysis, but also how well it can be made visible and collectable. Shoeprints in the garden of a burgled house can be of high quality right after the crime, but if it starts raining before the print has been examined the trace becomes rather useless. So external factors, such as the weather, will influence if traces will be recognized, selected and collected in the investigation.

Earlier we wrote about the influence prior information, the briefing the crime scene investigator got, will have on further decision making. Prior information is likely to create expectations with the crime scene investigator as to the type of crime and therefore the traces that might be available (Van den Eeden, 2018). This prior information is very likely to be specific for the crime as the information relates to the report that was being made about this crime.

The crime type itself might influence the crime scene investigators work as it is quite possible there are different policies for which type of evidence will be processed. In the Netherlands for instance the general policy with burglaries is to only collect finger prints and/or biological traces that might contain DNA. But as this policy can be different in different police regions (at least in the Netherlands) we see different traces that are collected. Figures 9.3 and 9.4 are

examples of this. First of all in contrast to the general policy not only finger prints and biological traces are selected and collected. And secondly there is a difference in which traces are collected between the police regions. The crime scene investigators in Hollands-Midden also collected digital evidence whereas this was not collect in the regions Gelderland-Midden and Gelderland-Zuid.

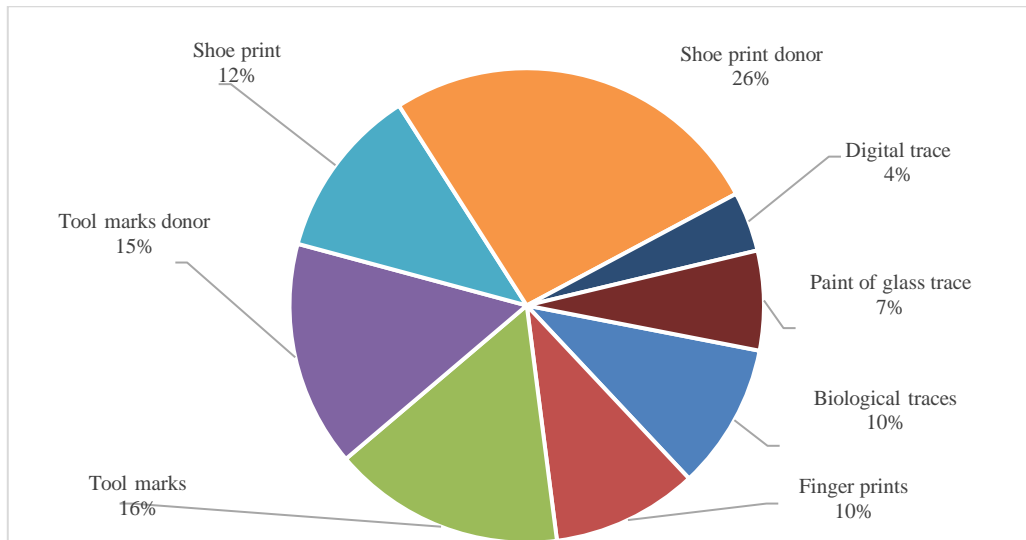


Figure 3. Collected evidence of domestic burglaries in police region Hollands Midden (N= 221)

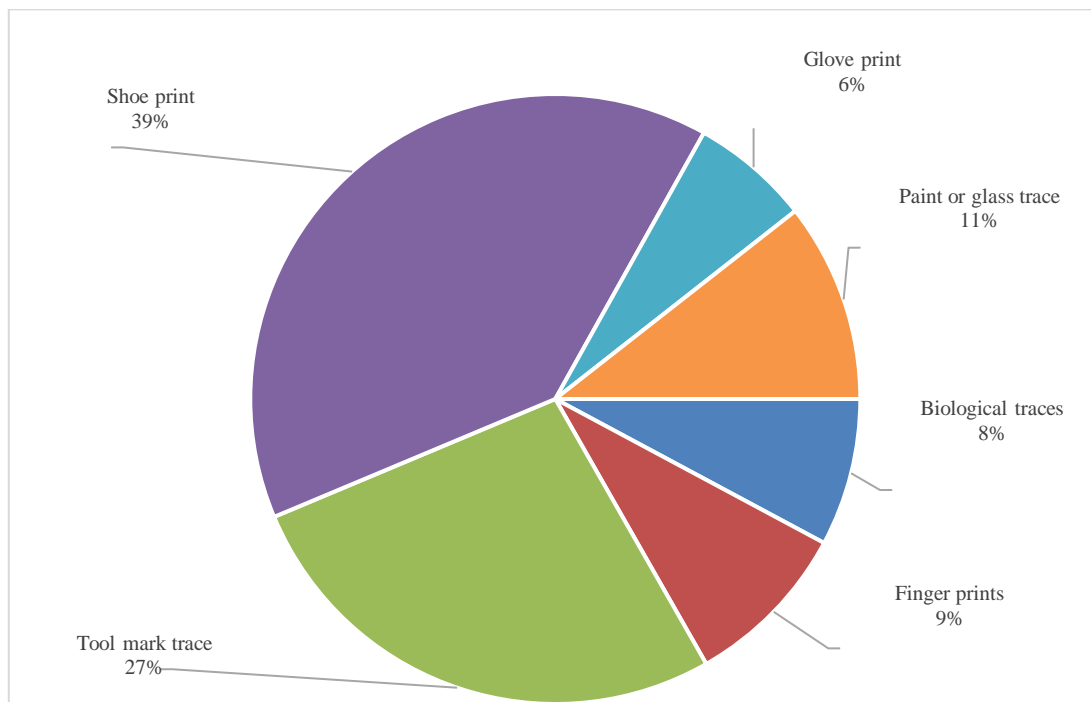


Figure 4.. Collected evidence of domestic burglaries in police regions Gelderland-Midden and Gelderland-Zuid (N=728)

These differences might be attributed to different policies but do influence the selection at a specific crime scene. And at the crime scene the crime scene investigator is the one deciding to select and collect certain traces or not.

Meso level: Crime scene investigator

Just as each crime scene is unique every crime scene investigator is unique. Each investigator has different experiences, a different personality and response to pressure, a different mental and physical condition, and even might have a different education in using forensic techniques. Although we describe the factors as separate items it is quite clear these interact within each crime scene investigator. So when a crime scene investigator arrives at a crime scene all those factors can come into play when going through the phases of the crime scene investigation (De Gruijter, 2017). For example, an investigator with a dislike for the administrative work that comes with collecting evidence might – even unintentionally – collect less evidence than another crime scene investigator would. And just as criminals gain experience through committing crimes, gaining expertise, so will crime scene investigators who have investigated a lot of crimes scene gain experience (Kelty, Julian, & Robertson, 2011). In an experimental study with simulated crime scenes Baber and Butler (2012) found more experienced crime scene investigators were likely to use a different search strategy when looking for evidence than less experienced investigators. More specifically, the more experienced the more likely crime scene investigators seem to be searching for evidence rather than trying to reconstruct what happened. A similar result is seen in the study by De Gruijter et al. (2016) where the influence of new forensic technologies on the visual attention of crime scene investigators was studied. In this experimental study the crime scene investigators had access to (yet to be practically implemented) forensic identification techniques that can be used during the crime scene investigation. Those crime scene investigators that were in the experimental group (and as such had access to these techniques) were more likely to focus their investigation of the crime scene on traces that we assumed to be left by the perpetrator. De Gruijter et al. discuss that a qualitative analysis of their data suggests this influence is stronger in more experienced crime scene investigators.

As difference in expertise can also be seen when it comes to using new developed forensic techniques (De Poot, 2013). A crime scene investigator who has had training to use that particular new method, might use that newly gained knowledge during a crime scene investigation. Logically a crime scene investigator who is not trained in such a new method will not (be able to) use it. For example, the use of a new lighting technique to trace tiny blood stains can only be used during a crime scene investigation if the crime scene investigator is trained in using that technology. And if the trained crime scene investigator decides to use a new lighting technique chances are different traces are found than if a non-trained crime scene investigator had examined that crime scene. Even though Kelty et al. (2011) state that experience has the most important role to play it is clear the other factors are also important and that the crime scene investigator needs to work within the constraints of the police organisation.

Macro level: Police organisation

The police organisation, with specific policies (e.g. see the micro level section previously) and specific practices, will influence how crime scene investigators conduct their investigation. For instance the intelligence-led model of policing (most common in the UK) has led to intelligence-led crime scene investigation (Ribaux, Baylon, Lock, Delémont, Roux, Zing, & Margot, 2010). This means the organisational structure is such that prior information will be available for the crime scene investigator. An example described by Milne (2013) of intelligence-led crime scene investigation is that of the model used by the police in Swiss cantons. The Swiss police analysed and reported the evidence finding frequencies of shoe marks. Those shoe marks were also geographically mapped and shown to crime scene investigators. As such the crime scene investigators will be prone to examine the crime scene for shoe prints that might be linked as the investigative potential of linking those crimes is made clear by sharing the information.

Regional police force policy to either collect or not collect a certain type of forensic evidence will influence the behaviour and decision making of the crime scene investigator. This policy can be based on – what is known as – the service level agreements between a police force and a forensic institute or laboratory. If there is a limit set on the amount and type of forensic evidence that can be analysed crime scene investigators tend to be more selective even at the crime scene (Van Wijk, Hardeman, & Appelman, 2013).

Lastly, the forensic technical norms that establish the manner in which traces should be collected to make sure their evidentiary value is safeguarded determine how a crime scene investigator should work. In practice crime scene investigators can and do deviate from the norms if they think the situation, i.e. the specific crime scene, requires them to do so (Kurpershoek, 2014). Unfortunately it is not common that the decision to deviate from the technical standard is documented. If a crime scene investigator assess that the traces in a particular crime scene might be better collected with an alternative rather than the standard technique it might be due to his or hers interpretation of the trace. For example if a latent finger print is seen in a window it can either be collected as a finger print for finger print identification analysis. Or that finger print might be swabbed to obtain potential biological traces for DNA-analysis. As a DNA-identification might be seen as stronger identification evidence by the crime scene investigator this therefore influences the choice of manner of collecting the evidence. A result might be that the biological traces are of such poor quality that no DNA-identification is possible, but since the finger print was swabbed for biological traces it is no impossible to collect the finger print as a dactyloscopic trace. Studies by De Gruijter suggest that the forensic technique that is interpreted as being the best in terms of potential identification of a suspect is favoured during crime scene examinations (De Gruijter, 2017).

Conclusions

In this chapter we gave an overview of the decision making process of crime scene investigators prior and during their crime scene investigation. We aimed at making clear how complex the decision making process is and how many different factors, from different levels influence

those decisions. Given the complexity, we give a schematic overview of the levels and factors within those levels in Figure 9.5. On the micro level [1] we distinguish the factors; the trace, its quality and external influences [1.1], prior information [1.2] and the crime type [1.3]. On the meso level [2] five factors are shown; the education level and knowledge of forensic techniques [2.1], the experience and knowledge of trace potential [2.2], the expertise about trace potential [2.3], a crime scene investigators' personality and coping strategy with stress [2.4] and the mental and physical condition [2.5]. The macro level [3] consists of four factors; the investigative structure used [3.1], the manner of sharing of information [3.2], the service level agreements with forensic laboratories [3.3] and the stated forensic technical norms [3.4].

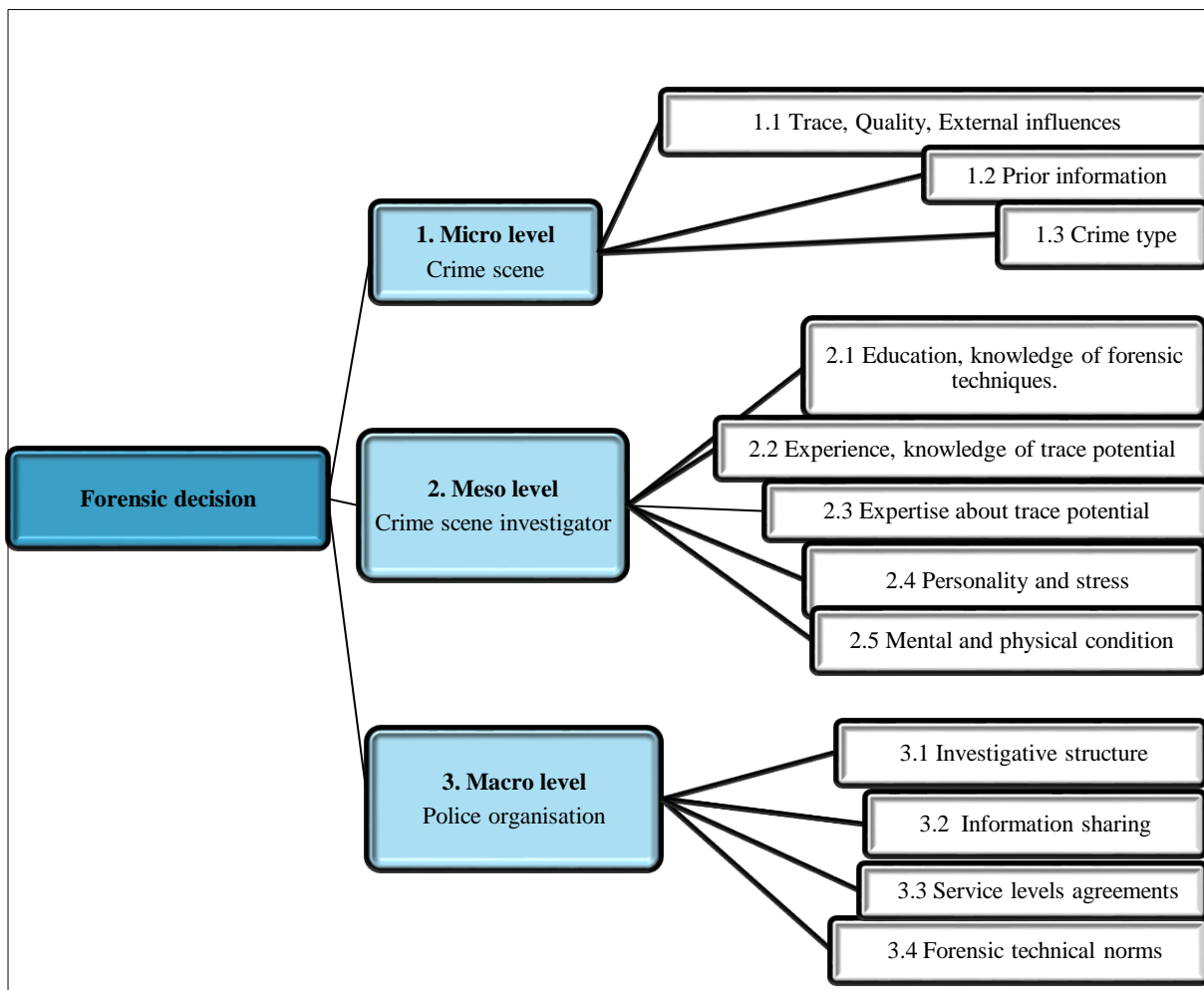


Figure 5. Schematic overview of factors and levels of influencing the forensic decision.

And next to this schematic overview a last example might make clear how the forensic decision might be influenced by different factors. In this example we refer with the numbers in brackets to the factors of schematic model in figure 9.5. A crime scene investigator is sent to a crime scene that was reported as a robbery [1.2 and 1.3]. This prior knowledge will influence how the crime scene investigator assesses the scene [1.2, 1.3 and 2.2]. This particular investigation

is the fourth crime scene investigation this crime scene investigator has to conduct on this day [2.4 and 2.5]. From having experience with examining robbery cases the crime scene investigator knows finger prints on the door of the shop are usually not relevant [1.1, 1.3, 2.2 and 2.3]. A tiny blood stain on the cash register might be crime related but since it is a hot summer's day the blood has dried [1.1]. Now the crime scene investigator prepares to collect that trace via a new method he recently learned as part of the ongoing training scheme of his police force [2.1 and 3.4]. A screwdriver found next to the cash register might have been used by the perpetrator to open the register, but as the crime scene investigator knows the number of tools that have been sent in for forensic examination is already at its limit the screwdriver is not further examined [3.1 and 3.3]. To be efficient his police force's strategy is to focus on traces that might identify suspects [3.1, 3.2 and 3.3]. This might be – in a nutshell – how factors on different levels influence the psychological process of a crime scene investigators decision making.¹

¹ For an overview of cognitive biases also see the forensic science regulator guidance report (2015): <https://www.gov.uk/government/publications/cognitive-bias-effects-relevant-to-forensic-science-examinations>

References

- Amelsvoort, A.G. van, Groenendal, H., & Manen, J. van (2004). Werkwijze bij het onderzoek op de plaats delict. *Justitiële verkenningen*, 30(4), 72-83.
- Baber, C. & Bulter, M. (2012) Expertise in crime scene examination: comparing search strategies of expert and novice crime scene examiners in simulated crime scenes. *Human Factors*, 54(3), 413-423.
- Broeders, A.P.A. (2003). *Op zoek naar de bron: Over de grondslagen van de criminalistiek en de waardering van het forensisch bewijs*. Deventer: Kluwer.
- Cangano, S., Elliott, K., Anoruo, K., Gass, J., & Buscaino, J. (2013). DNA Investigative Lead Development From Blood and Saliva Samples in Less Than Two Hours Using the RapidHIT Human DNA Identification System. Pleasanton: IntegenX Inc.
- Dawnay, N., Stafford-Allen, B., Moore, D., Blackman, S., Rendell, P., Hanson, E.K., ... Wells, S. (2014). Developmental Validation of the ParaDNA1 Screening System: A presumptive test for the detection of DNA on forensic evidence items. *Forensic Science International: Genetics*, 11, 73-79.
- Deten, S.C.H.H. (2016) *Crime scene investigation. Selection before Collection. Research into the Selection of Traces*. Masters thesis Criminologie, Vrije Universiteit Amsterdam.
- Dobben, Margot L. van ; Verkuijlen, Fien ; Jovanovic, Lidija ; Stokhof, Maarten R. ; Borst, Lex L.M., van Schaaik, Yara ; van Thiel, Marieke A.H. ; Willemsen, Milly ; van der Kemp, J.J. ; van Koppen, P.J (2018). De dansende dader: Veelzeggende experimenten. (Gerede Twijfel). Den Haag: Boom juridisch. (2018). De dansende dader: Veelzeggende experimenten. (Gerede Twijfel). Den Haag: Boom juridisch.
- Gruijter, M., de (2017). The influence of rapid identification technologies on CSI behaviour. PhD Thesis. Vrije Universiteit Amsterdam.
- Gruijter, M., de, Poot, C.J., de & Elffers, H.(2016) The influence of new technologies on the visual attention of CSIs performing a crime scene investigation. *Journal of Forensic Sciences*, 61 (1), 43-51.
- Eeden, C. A. J. van den (2018). Processing Crime Scenes: Psychological Influences on Forensic Inferences. PhD Thesis. Vrije Universiteit Amsterdam
- Eeden, C.A.J. van den & Gruijter, M. de Gruijter (2017). Psychologische invloeden op forensisch-technisch onderzoek. In P.J. van Koppen, J.W. de Keijser, R. Horselenberg & M. Jelcic (red.), *Routes van het recht: Over de rechtspsychologie* (pp. 217-247). Den Haag, Nederland: Boom Juridische uitgevers.
- Forensic Science Regulator (2015). Cognitive bias effects relevant to forensic science examinations. Guidance report. <https://www.gov.uk/government/publications/cognitive-bias-effects-relevant-to-forensic-science-examinations>
- Jacobs, M.J.G., Bruinsma, M.Y., Poppel, J.W.M.J. van, & Moors, J.A. (2005). Inzet, organisatie en kwaliteit van de forensisch-technische opsporing bij de politie in Nederland. Den Haag: WODC.
- Kassin, S.M., Dror, I.E. & Kukucka, J. (2013). The forensic confirmation bias: Problems, perspectives, and proposed solutions. *Journal of Applied Research in Memory and Cognition* 2 (2013) 42–52. <http://dx.doi.org/10.1016/j.jarmac.2013.01.001>
- Kelty, S.F., Julian, R., Robertson, J. (2011). Professionalism in Crime Scene Examination: The Seven Key Attributes of Top Crime Scene Examiners. *Forensic Science Policy & Management*, 2, 175-186.
- Kemp, J.J. van der & Koppen, P.J. van (2017). Profileren in de opsporing. In P.J. van Koppen, J.W. de Keijser, R. Horselenberg & M. Jelcic (red.), *Routes van het recht: Over de rechtspsychologie* (pp. 217-247). Den Haag, Nederland: Boom Juridische uitgevers.
- Kloosterman, A.D., & Meulenbroek, A.J. (2008). DNA-onderzoek van minimale biologische sporen; ‘gevoelige problematiek’. *Expertise en Recht*, 4, 108-120
- Koppen, P. van. (2011). Bewijsfouten en forensisch technisch bewijs. In P. van Koppen (Red.), *Overtuigend bewijs: Indammen van rechterlijke dwalingen* (2^{de} druk, pp. 120-142). Amsterdam: Nieuw Amsterdam.
- Kurpershoek, J. (2014). Opsporen volgens de Europese norm. *Blauw*, 10(3), 34-37.

- Mapes, A. (2012). The Expectations within the Criminal Justice System on the use of mobile DNA-Technologies at the Crime Scene: The power of the silent biological witness at the crime scene. *Forensic Science*, Hogeschool van Amsterdam, Amsterdam.
- Meulenbroek, A.J. (2008). Onderzoek van biologische sporen en DNA-onderzoek. In A.P.A. Broeders & E.R. Muller (Red.), *Forensische wetenschap: Studies over forensische kennis en organisatie* (pp. 205-296). Deventer: Kluwer.Miller, M.T. (2005). Crime Scene Investigation. In S.H. James, J.J. Nordby & S. Bell (Red.), *Forensic Science: An Introduction to Scientific and Investigative Techniques* (2nd edition, pp. 167-188). Florida: CRC Press. Milne, R. (2013). *Forensic intelligence*. Florida: CRC Press.
- Poot, C.J. de (2011). *Wetenschap op de plaats delict*. Lectoraat Forensisch Onderzoek. Apeldoorn: Politieacademie, Amsterdam: Hogeschool van Amsterdam.
- Poot, C.J. de (2013). Experimenteel onderzoek naar het werk van forensische rechercheurs: Leren op de plaats delict. In P. Tops, C. Sprenger & N. Kop (Red.), *Kennis in de frontlijn: Ervaringen met praktijkonderzoek in de politie* (pp. 157-174). Den Haag: Boom Lemma uitgevers.
- Ribaux, O., Baylon, A., Lock, E., Delémont, O., Roux, C., Zing. C., Margot, P. (2010). Intelligence-led crime scene processing. Part I: Forensic Intelligence. *Forensic Science International*, 195(1-3), 10-16.
- Stol, W.Ph., Kop, N., Koppenol, A., Evers, F.C.M. & Binnekamp, R. (2005), *Eén spoor is geen spoor. Naar een landelijke sporendatabank voor informatiegestuurde opsporing*. Den Haag: WODC
- Wijk, A. Van., Hardeman, M. & Appelman, T. (2013) *Toekomst forensisch onderzoek: Een inventarisatie van vraag en aanbod, organisatie, kwaliteit en financiën*. Arnhem Bureau Beke.

Authors:

Jasper J. van der Kemp is a legal psychologist and investigative criminologist at the VU School of Criminology at the Vrije Universiteit Amsterdam. His PhD is on fine-tuning geographical offender profiling. His research focuses on investigative decision-making and decision support tools.

Sharon C. H. H. Deten is an analyst and researcher at the Regionaal Informatie en Expertise Centrum Oost-Nederland. She received her Bachelor of Science in Criminology and Master of Science in Criminology from the Vrije Universiteit Amsterdam and her Master of Laws in Forensics, Criminology and Law from Maastricht University