'Mosaicking': Cross Construction, Sense-Making and Methods of Police Investigation

Martin Innes, Fiona Brookman and Helen Jones

Abstract

Purpose

This article explores how homicide detectives make sense of and manipulate multiple physical, digital and informational artefacts when assembling case narratives. We introduce the concept of mosaicking to illuminate how different modes of information, deriving from different investigative methods, are used in concert at key moments of the investigative process – defining what type of crime has occurred; the incrimination and elimination of suspects; and decisions to charge key suspects.

Methodology

The data qualitatively analysed include several hundred case papers, interview transcripts (n=144) and detailed ethnographic fieldnotes relating to 44 homicide investigations across four police services. These were collected during a four year ethnographic study of the use of forensic sciences and technologies (FSTs) in British homicide investigations.

Findings

Mosaicking describes how investigators blend and combine information, intelligence and evidence generated via different techniques and methods, to make sense of 'who did what to whom and why?' Through processes of convergent and divergent mosaicking, detectives are able to 'lean' on difference kinds of material to reinforce or connect key points of evidence or intelligence.

Originality

The findings fill a gap in knowledge about how investigators blend and composite diverse sources of information in the construction of case narratives. The findings present a more complex and nuanced understanding of the epistemological and interpretative work conducted by contemporary detectives, given the array of investigative technologies they increasingly have at their disposal.

Introduction and Context

Compared with the volume of research on the conduct of street policing and the fabrication of social order (Fielding, 1995), far less scholarly attention has been directed to the investigation and detection of crime by police (Reiner, 2010). This is despite the fact that detective work exerts a considerable gravitational pull upon the public understanding of policing. For in both fictional and factual reporting of what the police do and how, the motif of the indefatigable crime-solver, possessed of a particular perceptual acuity to divine human motivations and behaviour, often through application of leading-edge science, is a significant cultural trope and thus influence upon the popular imagination.

The scholarly work that has attended to the methods and conduct of crime investigation can be organised around three principal 'framings'. These we label the: 'conduct'; 'crime'; and 'techniques' frames, respectively. There is some overlap between them, but they are worth discussing separately, to map how academic work on crime investigation has been organised and conceptualised.

The conduct frame focuses upon describing how detective work gets done in terms of key patterns of activity, and there are several different positions about this available in the literature. For example, Gill (2000) asserts that much of what passes for investigative work centres upon a group of suspects who are well 'known' to police, on the grounds that they repeatedly engage in criminal behaviour (see also Maguire, 2000). This is an elaboration of Matza's (1969) seminal differentiation between 'methodical' and 'bureaucratic' suspicion.

A rather different representation of the routines and rhythms of detective work is derived from Hobbs' ethnographic portrait situated in the 'East-End' of London in the early 1980s. His 'rich' and detailed account, brings through the entrepreneurial and 'craft' skills of his subjects, as they negotiate a series of encounters and exchanges with their criminal adversaries. The direct counterpoint to which is to be found in Ericson's (1982) 'Making Crime'. Ericson's depiction pivots around the bureaucratic nature of managing case files, as the essence of what police detectives spend most of their time doing. This was a theme he extended in his subsequent book with Haggerty (Ericson and Haggerty, 1997). In his account of the work of homicide investigations, Innes (2003) advances what Brodeur (2010) dubs a more 'epistemological' account. This pivots around the notion that fundamentally detectives

are engaged in the construction and communication of knowledge, requiring them to separate the 'signals' from the noise, to render a narrative account of what has transpired.

Innes' (2003) work links also to the 'crime-led' framing of detective work, focusing as it does upon the social organisation of murder enquiries and their unique dynamics. The defining quality of crime led accounts is that the empirical focus of the discussion is describing how the nature of particular crime types shapes and configures the police response to it. Examples of this are: Brookman *et al.* (2019; 2020a); Hawk and Dabney (2014) on homicide investigations; and Bacon's (2016) analysis of serious organised crime policing. In respect of the former, a body of literature on homicide case closure, emanating largely from the United States, illuminates the combined influence of various management practices, investigative procedures, and analytical methods in successful case clearance (see Brookman *et al.,* 2019 for an overview).

The final frame comprises accounts that specialise in particular kinds of investigative technique. For instance, Leo's (2008) compelling account of the role of suspect interrogation in the crime investigation process, Johnson and Williams' (2007) detailed analyses of DNA and the National DNA database as a socio-technical affordance informing criminal investigations, and Brookman and Jones' (2021) account of the increasing prominence of CCTV as an investigative tool.

The latter framing is especially salient for the argument to be advanced in this article in two regards. For one of the key developments in the conduct of criminal investigations has been the increasing diversification of sources via which intelligence and evidence can be derived. However, little analysis has attended to how investigators blend and composite these different sources, in constructing their narrative of who did what to whom and why? (Brookman *et al*., 2019). The ways different types of information interact with each other, and their use to support each other, and the frictions arising between them, are significant and intriguing issues in terms of comprehending detectives' knowledge work.

It is to this gap in our knowledge that the present article is oriented. Specifically, informed by extensive empirical materials collected during a project focused upon British homicide investigations, we introduce the concept of 'mosaicking' to articulate how different types of information, intelligence and evidence are blended together to form the case narrative that is

constructed. Precedent for thinking in such terms is to be found in Innes *et al.*'s (2005) ethnography of police crime analysts' sense-making work, as they 'grapple' with frequently 'noisy' (lots of irrelevant material) and 'gappy' (incomplete) datasets. Drawing upon the notion of 'bricolage' originating in the literature on science and technology studies (Garfinkel *et al.,* 1981; Lynch and Woolgar, 1990), Innes *et al.* describe processes of 'analytic bricolage' to illuminate how analysts work to combine data sources and draw abductive inferences that guide future actions and interpretations. Herein though, we shift the focus of attention from civilian analysts to police detectives engaged in especially complex forms of investigation, involving the manipulation of a multiplicity of physical, digital and informational artefacts. To focus the discussion, we consider three key moments in the investigative process: the definition of situation in terms of what type of crime it is thought to be; the incrimination and elimination of suspects; and decisions to charge prime suspects.

The next section briefly describes the methodology and how the empirical materials were collected and analysed. The main body of the paper is then organised around the three key moments in the investigative trajectory outlined above. The conclusion draws the implications and insights together, especially in terms of how we think about the practical accomplishment of investigative work.

Data and Methods

The Study and Research Sites

Data were gathered during an ethnographic study of the use of forensic sciences and technologies (FSTs) in British homicide investigations conducted by the second and third authors.[i] The research aimed to provide an in-depth understanding of how FSTs contribute to the police investigation of homicide. The data include case papers, interview transcripts and ethnographic fieldnotes from 44 homicide investigations across four police services. The participating police services were chosen due to their distinctively different models of forensic science provision, ranging from comprehensive services provided by a public forensic laboratory, through to those with smaller in-house capabilities, such as blood screening, who rely on private forensic science providers for the vast majority of their work.[ii] The police services ranged in size and geographical coverage, including two large

forces with high volumes of homicide, and two with medium levels. All reported data relating to research participants and cases has been disguised to preserve anonymity.

The Cases

All offences, except for two, took place between 2011 and 2017, with most occurring between 2014 and 2017. Thirty-three investigations were completed (or virtually completed) at the time of data gathering (i.e. a guilty verdict of murder or manslaughter was reached at court, or agreed through pleas). These completed cases were sampled from summary lists provided by each police service to reflect a range of modus-operandi, victim-offender relationship, motive, circumstance and forensic contributions. An additional, eleven cases were live investigations observed as they unfolded, including two where the victims survived, despite the prognosis that they were likely to die from their injuries. Although selection of live investigations was less structured, in aggregate they represent the diversity reflected in the completed investigations. The 44 cases studied thus include some where suspects were identified very quickly through to complex, protracted investigations.

For each investigation we retrieved case papers and/or made extensive notes from documents. The documentary material included police closing reports, policy files from senior investigating officers (SIOs) and crime scene managers, minutes from forensic strategy meetings, briefing notes, statements and reports from forensic scientists and other experts, and prosecution documents. We spent 650 hours retrieving these data.

In-depth semi-structured interviews were conducted with 134 criminal justice practitioners – 118 of whom were involved directly in one of the 44 cases studied. Interviewees were recruited to reflect a range of roles and experiences, and included SIOs or deputy SIOs, detectives, crime scene managers/coordinators, forensic scientists, fingerprint examiners, digital forensic experts and CCTV officers. The data presented here are largely drawn from interviews with SIOs, Deputy SIOs and officers performing specialist roles – many of whom were 'career detectives' working within major crime. All interviews (except one) were digitally recorded and transcribed, with an average interview length of 83 minutes. We also conducted 10 informal interviews with forensic practitioners during tours of forensic science facilities.

The third phase of the research involved immersive ethnographic observation of 11 live homicide investigations across the four police services. We spent 700 hours observing different moments of homicide investigation, from the initial scene attendance by detectives and forensic scientists, through to trials at court. We were given virtually unfettered access to these investigations and were usually able to attend within a day. We entered crime scenes and observed discussion and debate amongst crime scene managers, SIOs, forensic scientists, and other experts. We accompanied detectives on house-to-house and CCTV enquiries, and attended daily briefings, forensic strategy meetings, prosecutors' conferences, and trials.

Data Analysis

Interview transcripts, fieldnotes, case papers and notes made from these were all uploaded into NVivo 12 and analysed thematically (Braun and Clarke, 2006). This involved engaging regularly with the data and ultimately creating (i) memos containing reflections and (ii) nodes of conceptual categories in accordance with analytic induction principles (Hammersley, 2004). We regularly discussed emerging findings and developed and agreed more than 450 nodes, subsequently refining (collapsing or expanding) as our analysis progressed. In this article, we focus on 25 nodes that reflect the practices associated with mosaicking, including: 'potential homicide'; 'complex scenes'; 'combining intelligence, evidence or information'; 'elimination'; 'implicating suspects'; and 'inconsistencies/inconclusive findings'.

Findings

Definitions of the Crime Situation

> Well we had eye witnesses to the attack…The main thing that bolstered their
> evidence was the CCTV footage, which was really graphic and horrific.…the
> knife, that was recovered and some clothing of the deceased and clothing of the
> accused, swabs that we took from the deceased…All of that, I mean it was quite
> clear what had happened but that was just to give us that forensic connection
> between the two of them and proving that the knife was the knife used in the
> murder … It all came back contact DNA from deceased to accused and vice versa.
> (SIO, Op. N10)

This extract from an interview with an SIO neatly articulates the base principles of what we refer to as mosaicking – assembling different kinds of evidence to generate inferences and cross-validate elements of the narrative about who did what to whom and why. The investigation in question was fairly straightforward, inasmuch as there were several eyewitnesses to the attack able to provide good identification evidence of the suspect, plus the suspect remained at the scene. These notwithstanding, the detectives and forensic scientists used multiple forms of forensic analysis to derive contact trace materials that evidenced the victim and suspect had been in physical contact with one another, and with the bladed murder weapon.

The above case conforms to the model of what Innes (2003), drawing upon the indigenous terms used by the murder investigators he studied, dubbed 'self-solvers'. These make up the vast majority of criminal homicide investigations conducted in the UK, reflecting the inter-personal dynamics that drive most episodes of fatal violence. The defining quality of such cases is not suspect identification – as frequently this is either immediately evident, or apparent upon conducting initial and preliminary lines of enquiry. Rather, the challenge for detectives gravitates around securing enough evidence to prove to a legal standard of 'beyond reasonable doubt' their narrative of what happened, such that it cannot be disputed or discredited by defence counsel at trial. This frequently involves months of painstaking work.

In the context of the current article however, the crucial point of the above example, is demonstrating how mosaicking together different kinds of evidential material is an integral part of the contemporary investigative process for the large number of more routine homicide investigations conducted. Even though in such cases eyewitness accounts and suspect confessions under interview provide the key ingredients, the results from other types of forensic analyses still play an important part in validating materials derived from other sources.

Where fictional depictions of detective work that gravitate around the 'whodunnit' narrative trope have tended to accent the pursuit of the perpetrator, more sociologically inflected accounts of crime investigation work have centred how the most pivotal moment in the investigative process concerns the initial decision to label an incident as a crime (Innes, 2003; Brookman *et al.,* 2020b). As Havard (1960) argued several decades ago, there are heightened

risks of missing indicators of criminal intent and action, especially where victims are already vulnerable.

This pertains to a case where the female victim's state of health, combined with the initial account provided by her partner of her death, served to reassure the first officers attending the scene that there was nothing untoward. As a consequence, little was done to preserve potential sites of evidence at the scene of death, or in respect of the victim's body. However, subsequently, this initial understanding started to unravel. For it transpired that the paramedics who had first entered the scene had expressed suspicions about the circumstances that initially confronted them, but these had not been conveyed to the Major Crime Team. Then critically, at the post-mortem the pathologist also voiced concerns.

The following are extracts from fieldnotes relating to a briefing given by the SIO where they summarized the issues:

> The forensic medical examiner attended and she had no concerns. She felt that the account given by Robert Gibson [suspect] was quite plausible. Therefore, this was not elevated to a suspicious death and the protocols for a sudden death were put in place. This may have had implications for evidence gathering - we potentially missed some evidence. For example, the body was removed by the undertaker and has been washed etc. so we can't recover evidence as we might have from tapings from the skin… (Extract from fieldnotes, Op. C01)

In line with standard operating procedures, the next day the initial reports were reviewed by officers from the Major Crime Team, and as the SIO described:

> …some concerns were raised as the deceased had some unexplained facial injuries and Robert had admitted that they had an argument.

Analytically, this represents a crucial point in that, when blending different information sources, they do not always align. Sometimes they contradict each other, or the working narrative that is being constructed. When this occurs, it necessitates checking the validity of the provenance of the various sources, and the interpretations and assumptions relating to them. In this specific case, it was at the post-mortem where such concerns surfaced, because:

the Home Office Pathologist raises grave concerns indicating that this is most likely a murder not a sudden death.

The cause for their concern gravitated around injuries to the deceased's stomach and face. Whilst for the latter, the suspect had said under interview that he had tried to 'pump' the victim's stomach to make them vomit, thus accounting for the bruising to the stomach area, he did not mention, nor could he account for, markings on the victim's face. Noted is the fact that it was the disparities between two different modalities of evidence that induced increasing concern amongst the investigators – the evidence from the pathologist and how this conflicted with the verbal account provided during the suspect's interview.

This episode clearly conveys how and why contact trace materials are so important to and influential upon the investigative process. For whilst witness accounts are subject to the vagaries of human perception and memory (Leo, 2008), physical evidence is argued to be more objective in denoting that at some point an interaction occurred between two or more surfaces. Of course, the challenge for investigators is explaining and justifying how, when and why these contacts occurred. Nevertheless, what is not disputed is that physical contact occurred. It is for this reason, that such evidence frequently features as important 'anchor points' in the formulation of any investigative narrative (Brookman *et al*., 2020a). For any such account has to be able to encompass and embed the presence of these contacts in the sequence of events laid out.

Triggered by the post-mortem findings, a forensic search was initiated at the crime scene for blood spatters and similar. None were found. However, what is pertinent for the interests of this article, is how the detectives are searching for different kinds of evidence to support their decision for 'reframing' (Goffman, 1975, p.308) the case as a murder, rather than a sudden death. And whilst the search for physical evidence in the property returned negative results, it did identify multiple digital devices that were seized and submitted for analysis.

These data afford a good view of how detectives mosaic together different kinds of intelligence, information and evidence, derived from multiple sources, to inform their decisions and judgements about how to classify an incident. These initial classifications are highly consequential as they establish a form of path dependency in terms of what actions

and interpretations are likely to follow (Jones, 2016). The case in question is especially interesting because it is an episode where the initial classification and response was assessed to have been wrong. As this became apparent, the SIO's lines of enquiry were actively searching for different evidential materials that, based upon their experience, they felt might assist them in confirming the suspicions being articulated by others in the investigative network. The key conceptual point being that mosaicking is actively initiated in terms of how investigators assemble and configure an understanding of the circumstances confronting them. In this particular instance, the start point was fairly traditional forms of information from the pathologist in tandem with an interview with the deceased person's last known contact. But as we shall see with other cases, sometimes the key 'anchor points' for mosaicking information are more innovative forms of digital evidence.

Incriminating and Eliminating Suspects

The second strand of investigative work significantly shaped by mosaicking, concerns incriminating and eliminating potential suspects. These are the points in the investigation where the key question shifts from 'is this a crime or not?' to 'who might be responsible for committing it?' Aside from the most blatant 'self-solvers', it is not uncommon for major crime investigations to cycle through considering a number of different suspects. For each, detectives have to consider signals for their involvement in the crime under examination, as well as indicators that might disprove any such association.

The role of different modes of intelligence and evidence in assembling suspicions about particular individuals was clearly visible in case N13. As the Deputy SIO described it:

> Biology was definitely crucial to [the investigation]. Probably the most crucial in terms of your traditional forensics, but then you're moving to digital and CCTV as well. The phones, we got a lot of evidence off phone work round about cell site, which was putting [the suspect at the scene] and also actually downloads of [the victim's] phone. So I think a combination of both. Probably the biology stuff was crucial for proving the crime and the phone stuff was crucial for proving motive. (Deputy SIO, Op. N13)

As noted in the last sentence, one feature of mosaicking together different intelligence and evidential materials is that they can provide different insights into the crime in question. In terms of incriminating the suspect in this particular case, the physical evidence was vital in linking the suspect to the criminal act, whilst the digital data derived from their phone were used to infer the suspect's possession of intent and motive. Obviously, both action and intent are needed for a charge of murder.

The dynamics here are analogous to some of the patterns and logics of validation and confirmation that have been discussed at length in the literature on social research methodology (Denzin, 1978). Practices of 'convergent triangulation' are where evidence and insights deriving from different methods support one another on the same analytic point. Contrasted with which, 'divergent triangulation' covers where different data are used to make distinct, but associated, inferences. The account provided above is an example of this latter formation, whereas the first case (C01) was more similar to the convergent notion.

Of course, these models are not mutually exclusive and can co-occur within the same investigation. For example, in case N13, the Deputy SIO elaborated how several different items of physical evidence were interpreted collectively in such a way as to incriminate the suspect (Brian), by placing him at the scene, in contact with the deceased (Wendy), and her son (Steven), when violence occurred against both:

> Probably the best evidence we got for that was in the boot of his car was a fleece top that was found and when examined it had Wendy's and Steven's blood on it, and then when you looked at the wearer DNA to see who had been wearing it, that came back as Brian. So that was really good evidence for us because that showed us, not only was it the blood, the pattern mark of it, they were able to say that he was there at the time of the assault because it was patterned as opposed to just blood transference. So evidence-wise that was brilliant. That put him in the scene at the time the assault took place. So that was really, really good.

One of the things that can be distilled from the previous examples is that mosaicking together different intelligence and evidence sources is important for investigators in answering several critical questions. They are not just interested in 'whodunnit?', but also 'howdunnit? and 'whydunnit?' Each of which are vital considerations in terms of incriminating potential

suspects and thus investing additional effort in lines of enquiry directed towards substantiating such suspicions. Equally however, if evidence to answer these questions is not forthcoming, or contradicts previous inferences and suppositions, this might trigger a decision to eliminate the individual from further consideration.

Case W08 involved the initial report of a mother who had gone missing with her two sons. Subsequent enquiries identified that they had been killed in their family home and buried in the garden. When interviewed, the SIO provided a clear account of how it was insights derived from multiple investigative techniques that were aggregated together, with each of them confirming and growing the volume of incriminating material about the husband/father who was the focus of the lines of enquiry:

> …it was overlaying the financial work which showed his card usage, and the phone work which showed us the movements, and with every movement the CCTV strategy then is, wherever there's a financial or a phone movement, just go for CCTV… We're not talking about little drops and splatters, this is a lot of blood, a lot of blood.

The suspect's use of bank and credit cards enabled detectives to place him at particular physical locations at specific points in time, which were used to structure the search for possible CCTV footage. Phone data were used in a similar way, but also to build up a picture of the suspect's 'pattern of life' in terms of their routine activities and interactions with a number of individuals of interest to the enquiry. None of these items gave cause to the SIO to think the individual concerned should be eliminated from further suspicion. Taken in tandem with the identification of the large amounts of blood mentioned, this clearly directed the development of the SIO's increasing suspicion.

One of the intriguing recurring motifs across the preceding extracts has been the role of digital intelligence and evidence. Much has been written about the disruptive and transformative impacts that digital technologies are having upon the social, political and economic organisation of life (Margetts *et al.,* 2016) Analogous impacts appear to be occurring also in terms of the investigation and detection of crime (Brookman and Jones, 2021). Such processes were clearly on display in case C05 where the Office Manager described some fairly innovative work using data from the suspect's Fitbit:

…the print-out of the data from the Fitbit, which he obviously was wearing throughout the time that it happened. It was amazing how accurate it was… it recorded activity and the time basically… the Saturday morning when we know he puts the victim into the car and drives him up to XXX.

Interpreting the digital data tracking the suspect's movements and activity patterns allowed detectives to locate, with a high degree of accuracy, when the suspect was trying to dispose of the body. As the interviewee went on to describe, they used these data from his personal digital device, in conjunction with a second source of digital evidence from the national Automated Number Plate Recognition (ANPR) camera network:

There's a flurry of activity… where he's doing something fairly strenuous. Then we know from the ANPR for four hours on that day he's driving, so there's hardly any activity at all. Then at the time, again through the ANPR, the time when he's sort of arriving [at the deposition site], there's a little flurry of activity again, whereby one particular section of it indicates that whatever he's doing is quite strenuous, and that's probably the time when he places the body [at the deposition site]. So we was looking at it and comparing it with the ANPR footage and the CCTV footage, it was quite remarkable actually how accurate it was. It sort of pieced what's happened. Even with that, if you look the days before, you could almost pinpoint perhaps when he was cleaning up the flat after he'd killed [the victim], or when he'd perhaps initially moved the body.

In this particular instance, the digital data acquired by the detectives afforded them almost unparalleled insight into the pattern of life of the suspect, and some specific moments where there were anomalous bursts of physical activity. It is an episode that clearly conveys how the pervasive availability of 'digital dust' and electronic traces of our actions and interactions constructs new investigative opportunities for police. Equally however, the sheer scale and volume of these digital traces itself establishes new complexities for police – in terms of being able to find and locate these 'investigative signals' in amongst the vast amounts of digital detritus and noise most citizens generate these days (Collie, 2018).

As alluded to in previous passages, however, mosaicking information is not just important for incrimination, it can have an equally influential role in processes of elimination. Whilst an individual item of evidence can provide a strong indicator of suspicion and thus support increasing incrimination, if there are other indicators contradicting this, then it may provide grounds for elimination.

This pattern was exemplified in case N11 where, as the SIO described:

> But the most important thing is that we were able to eliminate four other strong, I wouldn't call them suspects, but certainly persons of significant interest to us. We were able to eliminate them as being suspects, which left the focus solely on our guy … And it was all about negating certain individuals' statements, that they said they weren't in the house. Obviously we don't just take their word for that, we would look at CCTV, we would look at their telephones, we would look at cell site on their phones, but importantly we would look at anything forensic that could confirm their version of events… So that's what we did and that's why we were left with one sole suspect and everybody else was eliminated.

This is a model of practical epistemology that is coherent with one of the structured techniques that Omand (2020) commends in his book on how national security intelligence analysts process and interpret incoming data. As he describes it, when looking at complex, contingent and frequently ambiguous situations, rather than simply looking for additional details to support an emerging hypothesis, it is more instructive to look for items that might actively disprove it. For if you cannot locate a 'disproof', it suggests the interpretation and inferences are indeed correct.

As rehearsed briefly in a preceding passage, when anomalous and contradictory evidence is identified, this has a complex impact upon detective decision-making and sense-making. In the following excerpt from a gang shooting case, the CCTV officer describes how the camera footage contradicted expert interpretation provided by an external forensic scientist:

> The guy we had on remand at that point was 6' 2", when you watch this footage you see that this guy is fairly tall, compared to everyone around, and there are hundreds of people about, you can get a feel, having watched the footage as many

times as me and my team did, that this guy is fairly tall… Initially she [scientist] said the gunman is 5' 3½", plus or minus a couple of inches, therefore it cannot be your man who is 6' 2"…. After these meetings with her[iii] she agreed actually I can't really eliminate your gunman because the tolerances are so great that they actually encompass just about everybody on the planet.

This episode gives a clear sense of how inconsistencies with different evidential sources, can influence how credible and plausible some of these are understood to be, and how they are subsequently treated by investigators.

Constructing the Case and Decisions to Charge

Innes (2003) introduced the notion of 'narrative reasoning', to accent the role of 'abductive reasoning' in how detectives construct knowledge, intelligence and evidence out of the raw informational materials collated through their lines of enquiry. Abduction involves reasoning to the best explanation on the basis of limited information. In an investigative context, this is framed by the structuring influence exerted by the fact that detectives know ultimately the product of their investigative actions and interpretations will be tested in an adversarial courtroom. To succeed in this setting, they know they need to establish a compelling and comprehensive story setting out 'who did what to whom and why' and the evidential support for this account (see also Brookman *et al*., 2020a).

There are not though an infinite variety of ways in which people kill. Rather, as attested to by a long tradition of research on the social epidemiology of homicide, there are clear patterns to how fatal violence is enacted and the reasons for this (Innes, 2003). Correspondingly, there are limited ways to describe such events. This is why the concept of narrative is so important for understanding the outputs of police investigations. For narrative holds that there are some base patterns and structures underpinning the stories that we collectively tell ourselves about ourselves. In proposing the notion of narrative reasoning, Innes' (2003) point is that this inflects the decision-making and work of police. The idea being that experienced officers know what types of information legal counsel and juries find persuasive for particular crime types. Consequently, they use this pre-emptive understanding to structure the story they tell and to identify gaps in the account, and thus what evidence they search for to fill these gaps.

The basic tenets of this approach and how different units of information can be mosaicked together were spelled out as follows:

> I would say the witnesses were the crux of it really. The forensics and the ANPR, data, telephony, showed a story, but if we'd had that and that alone, I don't think we would have convicted them. So it was the plausibility and the believability of the witnesses that made the jury sure. So I think without them being on board, they probably would have been acquitted. Certainly the forensics wouldn't have proven the job in its entirety. (SIO, Op. E12)

Consistent with how the previous data extracts have been interpreted, the critical point here is that it is the combination of the materials sourced from witnesses alongside the physical and digital evidence, that were both necessary in assembling a "plausible" and "believable" narrative.

Interestingly, in several other cases examined, detectives foregrounded the particular value of digital evidence in terms both of its prevalence, but also the seemingly unique investigative opportunities it afforded. For example, in the following, investigators inferred from digital traces, internal mental states, such as motive, intent and mental capacity, rendering the invisible, visible:

> In this day and age there is so much of an electronic footprint that everyone leaves behind that we can have all the best witnesses in the world, but there is an awful lot of passive data that we find on the phones that tells us an awful lot about victimology, how someone lived. Motivations for killing someone maybe, certain triggers about why it might have happened through their text communication. Their browser history might give you some indications around what thought processes are going through someone's head when they decide to start searching, Google searching certain sites, etc. So all of those things give weight to the Mens Rea, the intent behind what they were thinking. (SIO, Op. E08)

The ways narrative reasoning recursively structures and shapes investigative actions can be developed by looking in more detail at case C02. The backdrop to the following extract from fieldnotes was that the team had constructed an understanding of what they believe had led to

a fatal stabbing, but there was a gap in their evidence, in terms of placing the two suspects at the scene, and their travelling to and from it. The lead detectives knew this would be critical in being able to charge the suspects who had been arrested, and so they focused upon this gap in their chain of evidence, using it to justify investing additional effort in looking at CCTV footage:

> At the team briefing: SIO notes that they have to charge suspect 1 by 5pm tonight. He emphasises, as does D/SIO [Deputy SIO], that they ideally need CCTV to put to the suspects in interview today. D/SIO says that the witness has described two weapons; an army knife that suspect 1 used to stab the victim. D/SIO says "we've got this knife and it may assist with the CPS and charging decision…" D/SIO suggests that the H2H team are put onto CCTV. SIO agrees and says "I don't think that H2H will make or break the charging decision". (Extract from fieldnotes, Op. C02)

Following on from these developments and reflecting that the CCTV footage had become a major focus of the enquiry, later that day the D/SIO instructed the team reviewing this material:

> …that the SIO wants a plotted map showing where they have good CCTV of evidential value to show to the CPS later that day to inform the charging decision.

Narrative reasoning thus emerges as a way detectives both individually and collectively mosaic, combining and blending together information deriving from different sources in ways that will assemble it into a detailed, persuasive and compelling story, that lays out how and why a person ended up dead (see also Brookman *et al*., 2020a). It effectively shifts perspective to the end point of the investigation – and ultimately to the trial - and seeks to work back from there, thinking about how the different information and evidence can be fitted together.

By way of summary, the empirical materials and insights drawn from multiple homicide investigations presented across the preceding sections, illuminate how a logic and method of mosaicking is intrinsic to the ways detectives move from interpreting the often confused and ambiguous picture at a crime scene, to a state where they can assert a plausible, believable

and evidenced, narrative of what has transpired and who is responsible. It is an approach neatly summarised by one of our interviewees:

> Because it's about combining the power of extracting all of this information, isn't it? So data from ANPR, from phones, from downloads of phones, from computers, from witness accounts, and combining that to tell a really compelling account of what had happened in this murder. (Detective Sergeant, Op. E09)

Conclusion

This article has attended to the neglected, yet vital, epistemological work engaged by police investigators in terms of how they assemble and combine very different modes of intelligence and evidence to inform their understanding and action. There has been considerable academic work tracking and tracing how a range of new and innovative forensic and digital methods and techniques have been developed to inform crime investigations. And there have been intensive and detailed analyses of more traditional investigative techniques, such as investigative interviewing (Leo, 2008) and use of covert human intelligence sources (Loftus, 2019). The gap in our knowledge that has been left is how these different modes of knowledge are used in concert.

Informed by extensive ethnographic observation and qualitative interview data, this article has attended to the mechanics and dynamics of these sense-making processes. An important component of the analysis has been illuminating how these practical interpretations and uses are structured by the imperatives of the wider adversarial legal system. For running across the cases and data extracts reported, is a recurrent theme of detectives seeking to collate and construct their evidential materials in ways that pre-empt possible lines of attack that might be adopted by defence counsel at trial. Many of the interpretations and inferences investigators were observed drawing were anticipatory in nature, grounded in individual and collective experience about where attempts to subvert their narrative might be directed. Moreover, this forecasting tendency propels the momentum of officers engaging in mosaicking behaviour, as it encourages them to collect more and different kinds of evidence to substantiate their inferences and interpretations, to 'close down' potential lines of defence attack.

A second key theme concerns shifts in the credibility accorded to different kinds of evidence by police investigators. Previous studies have attested to how physical contact trace materials, and especially DNA evidence, are ascribed enhanced levels of objectivity (for example, Lynch, 2013). At least when juxtaposed with evidence derived from eyewitness and suspect interviews that are clearly shaped by the vagaries of human memory and perception. However, the empirical data reported herein, clearly convey a sense that digital evidence is becoming increasingly influential in the sense-making work performed by police investigators.

These shifts in detectives' perceptions of the validity and reliability of different types and units of information, intelligence and evidence are partially 'case contingent', but also shaped by wider patterns and trends. By case contingent we seek to draw attention to the fact that across the different cases researched, the evidence that investigative narratives were 'anchored' by, was not always the same, but was dependent on the volume and strength of materials available. In some instances, it was the eyewitness accounts that provided detectives with understanding, with digital and physical evidence being used to support and substantiate these inferences. However, when investigating other circumstances, it was observed that these primary and secondary evidential roles were inverted.

Critical here in understanding how these different forms of information are blended together is a concept of 'cross construction'. This is at the conceptual centre of how mosaicking as an interpretative and sense-making process works, framed by the wider logics and practices of the investigative process. The notion that evidence is socially constructed in such contexts is well established in the academic literature (Lynch *et al*., 2008; Kruse, 2016). However, what attending to the concept of 'cross construction' highlights is the extent to which this involves 'leaning' on different kinds of material in fabricating a narrative that sets out what has transpired. Analysis of the data suggests two principal patterns of convergent and divergent mosaicking. Convergent mosaicking occurs where several different sources are used to make the same point, reinforcing each other. Divergent mosaicking, by contrast, occurs where varied sources illuminate separate but linked claims that together help to fill out the case narrative. Taken together this is a more complex and nuanced understanding of the epistemological and interpretative work conducted by contemporary detectives given the array of investigative technologies they increasingly have at their disposal.

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[i] We adopt a broad and inclusive view of the range of FSTs that can be utilised in homicide investigations, such as DNA profiling, fingerprint examination, blood pattern analysis, ballistics interpretation, trace evidence analysis and digital evidence from mobile phones, computers and CCTV.

[ii] The term public in this context refers to forensic science provision that is funded by the police service or the police authority.

iii During the meetings the police were able to discredit the scientist's methodology. The scientist then revised her methodology, leading her to conclude that it was not possible to implicate or eliminate the suspect.