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Abstract

This paper considers the use of the products of surveillance, primarily images, as evidence within the criminal trial. These products, whether static images, video or voice recordings, are increasingly being mediated for the fact-finder via 'experts', proffering an opinion about the meaning of some surveillance image, artefact or trace. Common law courts, including those in Australia, the UK, Canada, and the US, have been surprisingly accommodating towards such evidence—allowing incriminating opinions to be presented by witnesses with questionable or unsubstantiated 'expertise'. Institutional and judicial responses tend to be inattentive to the reliability of such evidence, and display a misplaced faith in the capacity of traditional trial safeguards to expose and manage the weaknesses inherent in this type of evidence. In looking at the ways in which courts use CCTV images, voice recordings and other traces generated by surveillant assemblages, this paper offers a legal site for consideration that has not featured prominently in recent surveillance literature. It suggests that the preoccupations generated by the ubiquitous nature of everyday surveillance do not always map cleanly onto the use of surveillance artefacts in the criminal justice system. At the same time this paper explores how ideas and concepts familiar to the analysis of surveillance techniques, cultures, imaginaries and practices might inform our understanding of the criminal trial and its related processes. Fundamentally concerned with the *value* of such evidence, this paper argues that given the premium placed upon accuracy and fairness within the criminal trial, the state should be able to guarantee the basic trustworthiness of 'expert' opinions before interpretations derived from surveillant assemblages are admitted to assist with proof of identity and guilt.

1. Introduction: Law and/of Surveillance

The proliferation of surveillance systems, visual or otherwise, is an established feature of the surveillance of everyday life, and their expansion across public, quasi-public and private spaces is a recurring preoccupation within Surveillance Studies. This paper offers a critical response to the use of the *products* of such surveillance in the criminal justice system, and in particular within the courts. Fundamentally, this paper is concerned with addressing the *value* of surveillance products, routinely admitted in criminal proceedings to establish guilt, as *evidence*. We are particularly interested in the ways in which such incriminating evidence is being marshalled to prove identity through the privileging of certain incriminating opinions as 'expert'.¹ Noting that the use of images, and indeed other surveillance products within the criminal trial, has not featured prominently in critical approaches to the widespread

¹ In this paper we refer to 'experts' (in scare quotes) because we contend that there are real doubts as to whether some of the individuals allowed to give evidence have relevant expertise.

proliferation of (visual) surveillance systems, the aim of this paper is to expand the frame of analysis of surveillance artefacts and texts within Surveillance Studies. At the same time, it explores how concepts familiar to the analysis of surveillance practices, cultures and imaginaries might inform our understanding of *evidence* in the criminal trial. In particular, the concept of the multi-faceted surveillant assemblage (Haggerty and Ericson 2000, 2006; Lyon 2006b; Lyon 2007) offers productive ways to (re-)conceptualise the mutually constitutive relationships of *co-production* occurring in the criminal justice field between technologies, operatives (including 'expert' witnesses), legal procedures and end users.

While Surveillance Studies, like criminology before it, attends to the relationships between surveillance and the maintenance of social order (including the deterrence of crime), the criminal *trial* has not featured as prominently as a site for analysis (and contestation) in surveillance literatures. Rather, Surveillance Studies, when contemplating the relationships between surveillance, law and regulation, has generally been preoccupied with questions of privacy, rights, ownership and data control. Notwithstanding sustained critique, the concept of privacy remains a central organising principle within Surveillance Studies (Bennett 2012); and, arguably, the focus on privacy and its related preoccupations, including the regulation of public spaces, has intensified alongside the everyday turn in Surveillance Studies and the (renewed) interest in the role of surveillance as a mechanism of 'social sorting' (see e.g. Lyon 2007; Aas, Gundhus and Lomell 2009; Monahan 2011). Where Surveillance Studies has engaged more explicitly with criminal justice—in, for example, responses to criminal and terrorist threats—analysis tends to remain circumscribed by these same concerns, occasionally spilling over into discussions of technologies and techno-scientific imaginaries (e.g. Kroener 2013). However, while significant, the preoccupations commonly generated by the ubiquitous nature of everyday surveillance (see e.g. Surveillance Studies Network 2006), including when that monitoring is directed towards crime prevention (Smith 2008) or the threat of terrorism (Lyon 2006a; Winner 2006; DeFlem 2008), do not necessarily accord with the use of surveillance products either as intelligence or as evidence in criminal proceedings.² Nor do the many insightful accounts of contemporary surveillance—informed by challenges to the dominance of (dystopian) panopticism (Bigo 2006; Haggerty 2006; see also Goold 2004)—with their focus on the 'data double', or liquidity as the defining characteristic of contemporary surveillance society (Lyon 2010), or even on the 'society of control' (Bogard 2006; Lyon 2007), adequately capture the rather cumbersome and clumsy residual activities of criminal justice systems in their efforts to trace, identify, blame, convict (and incarcerate) actual offenders.³

So, in considering the legal regulation of surveillance technologies, practices and artefacts as incriminating evidence (and indirectly intelligence), we are not operating within the more conventional *legislative*, public law, frame that tends to dominate discussion of the effective, or appropriate, limits of surveillance practices both within Surveillance Studies and legal discourse.⁴ Within this more conventional frame we would include the regulatory and critical responses generated by concerns about constitutionalism, protections of human rights—particularly those associated with privacy, the proper use of information, or the management of 'encroachment' (e.g. Taylor 2011; though see also Monahan 2011; Haggerty and Ericson 2006)—as well as many of the responses more overtly concerned with criminal

² In particular, the risk narratives play out very differently; risks of misidentification and error carry very different implications where that (mis)identification is affirmed as a conviction. Surveillance Studies, in its concern for the monitoring of public space, privacy, and the expanded recording of 'innocent' activities, seems to be, on occasion, complacent about the targeted monitoring of 'illegal' conduct, and the fact that 'everyday life' is not the life of everyone.

³ This is notwithstanding the fact that the contemporary accounts of surveillance systems, particularly of CCTV, have challenged the operation, effectiveness and the preoccupations of such monitoring at a number of levels, including reflexively (Goold 2004; Smith 2008; Doyle et al. 2011), and the recognition that contemporary surveillance can act as an enabler, entrenching privilege as well as operating to exclude (e.g. Monahan 2011; Lyon 2007).

⁴ Our approach does have constitutional dimensions—for example, preserving the scope for jury participation and the obligation to provide a fair trial both have constitutional foundations and democratic implications—however these tend to be overshadowed by other rights. See for example Haggerty and Samatas 2010.

justice practice. This is not intended to imply that these are unimportant sites and issues. We echo concerns about the proliferation of (especially covert) surveillance evidence, as well as about the growing use of control orders and other forms of preventative surveillance and predictive detention (Tulich 2012). Like the regulation of police (mis)conduct, or of the fairness of criminal proceedings, they raise profound questions concerning social justice, human rights, and participation in the polity. However, to the extent that the literature examining the law/surveillance nexus has been dominated by the focus on (legislative) regulation, cultures of surveillance (Smith 2008), and technological possibilities, it tends to overlook, or occlude, epistemic dimensions and the significance of the role of the trial within the surveillance/criminal justice assemblage.⁵ This is unfortunate because Surveillance Studies, with its tools for understanding the local practices and cultures informing and structuring surveillance, is well suited to incorporating this additional dimension in its analysis of the dynamics associated with both the large scale monitoring of populations as well as the targeted monitoring that is generated for forensic purposes. While it is not our intention to suggest that trials and associated adjectival law are necessarily the most significant influence on investigative practices or the deployment of surveillance systems ‘upstream’, trials and appeals are important end-users that should not be ignored. Simultaneously, the very real limitations of the evidentiary products of surveillant assemblages may point to an attenuation of the concerns that motivate the proliferation of routine surveillance itself, and add a new dimension to its critique.

In this paper we argue that the ways courts have accommodated and incorporated surveillance images and forensic image comparison evidence into the criminal trial exemplifies a misplaced trust and exaggerated confidence, both in the reliability of the forensic sciences and in the effectiveness of traditional trial safeguards to expose and convey epistemic limitations. Thus we raise doubts about the willingness and the capacity of criminal justice institutions to effectively regulate or ‘gatekeep’ surveillance technologies and their textual products.⁶ For, in allowing those with questionable, unsubstantiated, ‘expertise’ to offer incriminating opinions about the identity of persons in images, courts have conferred a legitimacy (a truth value) on evidence of little, or at best *unknown*, reliability. And, despite its contested and uncertain value, such evidence is routinely presented to the fact-finder (usually the jury) as far more probative, in terms of its capacity to support a finding of guilt, than is warranted.⁷ Taking into account the risks that the admission of evidence that is *improperly* characterised as ‘expert’ may cause a trial to miscarry (see e.g. *Morgan v R*; *Wood v R*), and our contention that conventional trial safeguards are an inadequate substitute for exclusion, our motivation in this paper is overtly epistemic and, indeed, normative. We are not inattentive to the contingent nature of concepts such as ‘reliability’ or to the (de)construction of expertise and the ‘scientific’ within the trial and beyond (Jasanoff 1995; Lynch et al. 2008). Nonetheless, taking into account the premium placed on accuracy and fairness within the criminal justice context, on ‘doing justice in the pursuit of truth’ (Ho 2008), there are defensible grounds for tempering such reflexivity (and scepticism), and to insist on the state meeting (reasonably onerous) epistemic standards if it wishes to rely on incriminating ‘expert’ opinions to convict those accused of criminal acts.

⁵ We include, within the idea of the criminal trial, the pre-trial negotiations and voir dire (or equivalent) hearings held alongside the trial proper. In a voir dire hearing the judge considers the admissibility of contested evidence. In a jury trial, this will be in the absence of the jury.

⁶ Our focus is on the use of surveillance images. Noting, however, the recent, authoritative critical reviews of the forensic sciences (e.g. Saks and Koehler 2005; National Research Council 2009) discussed further below, our critique is equally applicable to the use of voice recordings and other surveillance artefacts, and has implications for forensic comparison evidence more generally, including latent fingerprints and DNA profiling.

⁷ We acknowledge that the dynamics of a judge only trial (where the judge is the fact-finder and decides both the applicable law and the ultimate issue of guilt) will be different. However the rules of evidence still apply, and our concerns in terms of the *value* of the evidence remain unabated.

2. Proliferation, Circulation, and (Mundane) Interpretation

A. Proliferation

The use of images in legal proceedings and related processes is not new. Photographs, film, video, and more recently the use of animation or other forms of visual and virtual reconstruction in the courtroom, have featured in trials either as evidence or as interpretive tools for fact-finders for decades (Mnookin 1998; Feigenson and Speisal 2009; Sherwin 2011). Similarly, the uses of photographs as investigative tools and for the identification and tracking of offenders have long histories (Finn 2009). Nevertheless, the proliferation of publicly and privately operated CCTV systems—often portrayed as a significant moment in the shift towards the mass monitoring of everyday activities (Monahan 2011)—has produced a much larger body of images that might be linked to criminal activities. As many commentators have noted, the utility of CCTV and other monitoring is contested, but often expands in the face of evidence of its (in)effectiveness (Goold 2004; Smith 2008; Hier 2010; Doyle et al. 2011). And, in addition to (state or commercial) surveillance of public, quasi-public and private spaces, most citizens now have access to recording capabilities through digital cameras or mobile phones, and law enforcement operations are often also (self) monitored via cameras attached to standard equipment. In consequence, it is now far more common to have images and other surveillance artefacts in circulation, potentially available to be adduced as evidence, and we anticipate that both the prevalence and reliance on these will increase. This context is important for understanding the mechanisms that have generated exponential growth in surveillance material (and materiel), as well as the *gaps* in coverage, as we extend the analysis to consider how trial (and investigative) practices have themselves changed in response to the increased availability of images.⁸

Alongside the exponential rise in the number and availability of images as potential evidence (and/or intelligence), courts in most jurisdictions have rapidly accommodated such visual artefacts. Photographs or video relating to the commission of the offence are routinely admitted into court, open to interpretation by the fact-finder.⁹ Images might be used to provide an overview of events and to determine what transpired. The clock and GPS coordinates recorded as metadata enable digital images to be used to help establish times and locations of people and activities. Images can be used to assist in the identification of individuals, to help to ascertain whether a particular individual was involved in some event, as well as who did what. The availability of CCTV can also be used to confirm or contest competing witness accounts. Surveillance footage can be used by defendants to challenge conventionally (or presumptively) trustworthy police narratives (Davies 2012).¹⁰ These developments are significant, both for what they reveal about the implicit faith in images as mechanical recordings of reality, but also for the potential of ‘sousveillance’ (e.g. Huey, Walby and Doyle 2006) to enhance accountability of law enforcement agencies. Where, however, as is often the case, images (or voice recordings) are of low quality, unclear or unintelligible, and far more ambiguous, it has been primarily police and prosecutors that have been turning

⁸ Noting also the contemporary practice of video recording interviews with suspects, for replay in court, has contributed to the proliferation of audiovisual materials presented to the fact-finder. See Dixon and Travis 2007.

⁹ The need for courts to develop rules and responses to this proliferation of images has been noted in recent reports, giving rise to new guidelines and a number of additional recommendations to assist courts in managing this evidence. See e.g. NSWLRC 2013; Judicial College of Victoria 2006 - 2013; Judicial Commission of New South Wales 2013. See also Edmond, Cole, Cunliffe and Roberts 2013; Edmond et al. 2010. Courts might limit access to particularly graphic images, or video, where exposing the jury to these images might be unfairly prejudicial to the defendant, but such exclusion rarely extends to material that is merely unclear.

¹⁰ For example the coronial inquest into police conduct leading to the death of Roberto Curti captured on ‘TASER-cam’ (Olding and Davies 2012). Such use of surveillance material, including custodial footage, raises important questions of principle in terms of the obligations of law enforcement and prosecutors to preserve evidence and disclose it to the defence. Similarly, the combined effect of increased availability of forensic images, the selective release of images by law enforcement during investigations, and a move towards open access to court records, generates multiple potential end users, including advocacy groups, media organisations and visual artists. Managing the flow of images thus raises additional questions not only about access to a fair trial in the face of publicity, but also about rights to privacy after a trial has concluded (Biber and San Roque 2006; Biber 2013; Valverde 2006).

to a range of supplementary ‘expert’ witnesses, to mediate and reinforce inculpatory interpretations of past events (e.g. *R v Drollet*) and/or to assist with the identification of persons involved in illegal activities.

B. Identification and/of Experts

Conventionally, witnesses in the adversarial tradition give evidence of fact—that is, describe what was directly perceived. They are ordinarily prohibited from expressing their opinions.¹¹ The rules regulating expert evidence, however, provide an exception to this general prohibition.¹² Legally recognised experts are those who possess relevant ‘specialised *knowledge*’ gained via ‘study, training or experience’. They are permitted to express opinions based upon their specialised knowledge.¹³ Where a surveillance artefact or trace is used to identify a potential source (or to reconstruct past events), the traces themselves will be presented directly to the fact-finder. Often, however, they will require mediation to enable the fact-finder to understand their significance, and this helps to explain the emergence of legally-recognised ‘experts’. In most cases involving surveillance and/or traces—such as with comparisons of DNA profiles, latent fingerprints and handwriting, or digital records encoded in phones or computer systems—a forensic analyst will appear at trial to proffer an incriminating opinion (i.e. her or his interpretation) of the significance of the artefact or trace. Often, this involves explicitly identifying a person (or object, such as a weapon or item of clothing) through linking putative similarities (or ‘matching’) and attributing significance to them, often intuitively (National Research Council 2009).

While courts and judges have expressed concerns about the value of expert opinions (and expert partisanship), particularly in civil litigation (e.g. Woolf 1996), they are far more trusting of (even confident about) incriminating ‘expert’ opinions derived from surveillance technologies. Given the sceptical posture adopted in civil litigation, we would argue that lawyers and judges have been surprisingly *uncritical* in their responses to those, with purported expertise, offering opinions to assist with the determination of guilt. Further, despite a reasonably cautious orientation toward identification evidence from *eyewitnesses*, no common law jurisdiction has developed coherent limits or effectively regulated the admission of the opinions of *displaced* observers engaged in image (or voice) comparison to identify, or assist with the identification of, persons of interest (Edmond, Cole, Cunliffe and Roberts 2013). As a starting point, all jurisdictions permit familiars, such as family members and longstanding acquaintances, to positively identify persons accused of crimes in relevant photographs or CCTV footage. This evidence is sometimes admitted as *recognition* evidence. Characterised as ‘factual’, recognition evidence is not caught by the exclusionary rules regulating opinion evidence—see Figure 1. Such classifications tend to raise subtle—and unhelpful—debates about the spontaneity and degree of cognition involved in the process of *identification*.¹⁴ Notwithstanding the latitude afforded to those with pre-investigative ‘familiarity’, it has been more common for prosecutors to (also) draw upon the opinions of individuals *involved* in the investigation and therefore conversant with information—often informal and inadmissible—about the suspect(s). These investigators, mostly investigating police officers, acquire familiarity with the suspects captured on incriminating recordings through watching. Problematically, such embedded witnesses are being recognised by courts as ‘ad hoc experts’, on the basis that they have

¹¹ This is notwithstanding the acknowledgement in cases and legal commentary that the fact/opinion distinction is best understood as a continuum. See for example *R v Smith*. In this paper we draw many of our examples from practices in Australian courts, particularly New South Wales (NSW). The rules of evidence that apply in most Australian courts are found in the (almost) Uniform Evidence Law (UEL) legislation (e.g. *Evidence Act 1995* (NSW)), but the broad evidentiary principles, such as the prohibition on opinion evidence, underpinning the specific rules within the UEL regime, are consistent with other common law jurisdictions, including Canada, the UK and the US.

¹² There are limited exceptions also for lay witnesses not directly relevant to this paper.

¹³ See, for example, s79 of the UEL. In other jurisdictions questions such as whether the witness possesses (specialised) knowledge beyond that of the fact-finder, whether the witness is part of a recognizable ‘field’ or used ‘generally acceptable’ techniques, or whether her or his account is reliable, form part of the admissibility framework.

¹⁴ We accept that most people are reasonably good at recognising true familiars in still and moving images. However classifying such evidence as ‘factual’ recognition evidence avoids important questions, such as to the relationship between level(s) of familiarity and accuracy, and this is compounded where the ‘familiarity’ has arisen solely via the investigation itself.

repeatedly watched (or in the case of voices, repeatedly listened to) the relevant recordings. Often, for reasons of expediency alone, these investigators are frequently allowed to identify a defendant (e.g. *R v Leung & Wong*).

Equally problematically, common law jurisdictions have increasingly accepted as ‘expert’ the opinions of a range of analysts—commonly referred to as face and/or body mappers—to assist in the interpretation of unclear images. Rather than possessing (demonstrated) expertise in the interpretation of images for identification (or some other crime-related purpose), such witnesses usually only have experience and/or qualifications in an arguably cognate domain—such as anatomy, physical anthropology, military intelligence, I.T., photography, or art (e.g. *R v Tang*; *Murdoch v The Queen*; *Atkins v The Queen*; *Morgan v R*). The recognition by courts of facial and body mapping analysts as ‘expert’ witnesses thus generally involves significant slippage in the application of the rules governing the admissibility of expert opinion, with little or no attention directed to how the analyst’s ‘specialised knowledge’ translates into an ability to productively analyse the kind of poorly resolved two-dimensional images exemplified in Figures 1 and 2.¹⁵ There is, in addition, slippage between the various categories as facial mapping ‘experts’ whose qualifications are (successfully) impugned are, none the less, permitted to proffer opinions as ‘ad hoc experts’ (e.g. *R v Tang*).



Figure 1. CCTV image of person of interest used in the investigation and prosecution of Bradley Murdoch for the abduction of Joanne Lees and murder of Peter Falconio. This scene was temporally and geographically proximate to the abduction. Facial mapping ‘experts’ and some persons with prior familiarity with Murdoch were allowed to express opinions—that the image depicts Murdoch—during the trial.

This largely uncritical authorisation of ‘expert’ opinions, ‘ad hoc’ or otherwise, pertaining to images can be situated within the expanding use of digital forensics and other attempts to introduce and rely upon surveillance evidence at trial. Though rapidly expanding as a form of intelligence and admissible evidence, aspects of image comparison and interpretation—such as continuity and preservation of files, image distortion, the significance of apparent similarities, contextual effects (and biasing), validation and error rates (see Section 3)—attend and threaten to subvert the conversion of a wide range of surveillance

¹⁵ See also, for example: http://news.bbc.co.uk/2/hi/uk_news/8317279.stm. We acknowledge that many images are of much higher resolution, but note that psychological studies suggest that even high quality images of strangers have surprisingly high error rates in comparison exercises.

artefacts into probative evidence.¹⁶ However, as discussed in the next section, the use of *images* as evidence creates peculiar problems for legal practice and proof when set against the accommodating reception of ‘expert’ interpretations of such images.

C. Interpretive circuits

Broadly speaking, there is a need to be far more attentive to the manner in which surveillance artefacts—whether images, recordings or visualisations of other traces such as latent fingerprints, or DNA electropherograms—are (re)presented in court and interpreted by the participants in the trial, including the jury (see e.g. Sherwin 2011 and also Kruger, this issue). But more specifically, one of the features (also applicable to voices) that distinguishes surveillance images, such as stills obtained via CCTV systems—e.g. Figures 1 and 2) from DNA profiles, ballistics and fingerprints, is that such images *present*, and critically, tend to be *presented*, as accessible to the lay fact-finder. Notwithstanding the increasing reliance on ‘experts’, courts continue to assume that lay people are conversant with the visual medium, and both judges and fact-finders tend to believe that they are able to attach meaning or significance to images far more reliably than experimental studies suggest (Kemp, Towell and Pike 1997; Davis and Valentine 2008). Consequently, even very poor quality images, or unintelligible voice recordings are placed before lay decision makers, and juries (and trial judges) have been encouraged to undertake their own assessment of these traces. At the *same time*, courts have accommodated witnesses claiming various forms of ‘expertise’ in the interpretation of images (and other recordings) in a manner that reveals the lay/expert divide developed and relied on by courts to be porous and incoherent.

These commitments, to the accessibility of images and the special abilities of those qualified as ‘expert’ opinion are exemplified in (*Mundarra Doolan*) *Smith v The Queen*. In *Smith v The Queen*, the High Court ruled that the evidence of police officers who testified that they *recognised* Smith in a series of still photographs (from a CCTV system) of a bank robbery was inadmissible. Rejecting special or long familiarity, the majority decided that the police witnesses’ prior exposure to Smith was no different in kind to the jury’s experience observing him in the dock during the trial. The autoptic nature of the surveillance evidence rendered the opinions of the police officers irrelevant.¹⁷ In rejecting the police officers’ opinions, the High Court put an end to routine reliance on the *recognition* (and opinion) evidence of police officers (Biber 2002, 2007)—a kind of visual verballing. However, seemingly oblivious to the general difficulties of photographic comparisons involving strangers and the particular dangers inherent in cross-racial comparisons (if the person of interest was, like Smith, an Aborigine), the High Court held that a future jury could be asked whether the figure depicted in the image was indeed Mundarra Smith. *Smith*, and similar cases in other jurisdictions, confirmed the imputed capacity of lay jurors and judges to interpret (reasonably) clear images. Simultaneously, and perhaps counter-intuitively, it contributed to the increased use of poor quality images, as trial practice and intermediate appellate courts adapted to the High Court’s suggestion that in the absence of ‘true’ (mundane) familiarity, some form of ‘expertise’ could make the opinion of displaced observers relevant and thus potentially admissible.

Australian courts, faced with potentially unintelligible (or unruly) images, readily accepted the claims of image ‘experts’, notably anatomists, that they could read photographic traces to reveal bodily features and even identity (e.g. *R v Tang*; *Murdoch v The Queen*; *R v Dastagir*). Just as anxieties about keeping track of offenders and the desire to be able to see through disguises and aliases were some of the key drivers behind the development of early attempts to systematically record facial and body features, similar concerns persist in the contemporary context as the prosecution enlisted face and body mapping ‘experts’ who claim be able to *see through* disguises to reveal identity (*R v Morgan*; *R v Sakriah*). With

¹⁶ In this respect these concerns extend, to varying degrees, to other surveillance technologies, including DNA profiling, fingerprints, handwriting and documents, ballistics and tool marks, bite marks, shoe prints, hair and fibre comparisons, as well as emerging technologies such as gait analysis and voice comparison.

¹⁷ Relevance is the primary threshold of admissibility; see e.g. ss55 and 56 of the UEL.

(prosecution) lawyers and judges, these displaced observers *co-produced* an apparently new *field* of ‘facial mapping’ to discipline ambiguous images and fill the evidentiary lacuna created by the general proscription on police recognition/identification imposed in *Smith*. Accommodating legal responses, driven primarily by the *availability* of crime-related images, replaced face to face familiarity with a seemingly objective, technically driven *emerging* ‘expertise’: the (re)creation of a ‘field of knowledge’ that bears all the hallmarks of earlier attempts to identify and stabilise the offender population (Becker 2001; Kaluszynski 2001; Finn 2009; Marx 2003; Cole 2001).

The growing reliance on images generated by CCTV systems as evidence of identity seems to correspond with the (uneven) development of different ‘ages’ of surveillance practice, from the pre-modern (face to face) monitoring of familiars to the postmodern, technologically driven forms of digital surveillance (Haggerty and Ericson 2006; Lyon 2007; Groebner 2007).¹⁸ But criminal justice systems are sites where a number of different surveillance relationships are simultaneously enacted; there are, for example, continuing anxieties around the inconsistent responses to the admission and use of opinion evidence to assist with identification. These overlapping modes and continuities—including the persistence of the focus on the body as a target of surveillance (Lyon 2001), and the recurring disciplinary contests between technologies (Cole 2001; Joseph 2001; Lyon 2001; Doyle 2006; Finn 2009)—are reflected in the (re)emergence of facial and body mapping in Australia (and elsewhere) following *Smith v The Queen*. And while echoing the anthropometry of Bertillon, contemporary manifestations of facial and body mapping are, somewhat perversely, apparently less attentive to questions of reliability than their precursors (Caplan 2001; Joseph 2001). And although police ‘familiarity’ with offenders was, in Australia at least, converted into inadmissible intelligence in the wake of *Smith*, we can none the less observe a reconfiguring of (localised) face to face knowledge, as mundane familiarity is transformed into ‘expertise’, through the recognition of the embedded ‘ad hoc expert’—who, by virtue of repeated listening or watching comes to *know* the offender (e.g. *Attorney General's Reference (No 2)*; *R v Leung*; *Li v The Queen*; *R v Tang*; *Honeysett v R*).

Thus the admission of (frequently *supplementary*) incriminating ‘expert’ interpretations of images are institutional attempts to accommodate and efficiently manage the exponential proliferation of potentially probative evidence emerging in recent decades, set against a background of broader structural changes and contests in the construction of technological expertise, conflicting expectations and persistent anxieties around the management of deviant populations. And as noted, judicial responses, and their accompanying surveillance imaginaries, operate in conjunction with a naïve confidence in the abilities of lay people—whether investigators, lawyers, judges or jurors—to undertake (or manage) image interpretation, and particularly identification, within the confines of the adversarial trial. Witnesses and decision makers are routinely asked or expected to approach such images as mechanical reproductions of reality; where interpretations are implicitly straightforward—relatively mundane or even intuitive activities (Sturken and Cartwright 2001; Sherwin 2011; Valverde 2006). Such an approach ignores the serious complexities associated with image interpretation (including the interpretation of images such as x-rays, fMRI scans and aerial photographs). Numerous controversies in the long history of photography and film reinforce just how complex and controversial images and their interpretations can be (Barthes 1977; Sontag 1977; Dumit 2003; Latour 2010; Morris 2011) and the trial context adds an additional dimension of complexity.¹⁹ However, it is important to emphasise a dimension that is peculiar to the kinds of intertextuality associated with the interpretation of these images by lay fact-finders in the shadow of incriminating opinions authorised by the court as ‘expert’. Where such opinions are presented embedded

¹⁸ It is worth noting that the jury was originally a body that knew the individual accused of the offence.

¹⁹ We point here to the need to understand the visual tropes, narratives, metaphors and expectations operating both generally, in terms of the visual and performative cultures in which the law is situated (Resnik and Curtis 2011; Douzinas and Nead 1999; Valverde 2006; Finn 2012), and specifically in terms of how these forces influence particular criminal trials (e.g. Biber 2007).

within the prosecution case, and alongside other incriminating evidence, it places the act of interpreting these artefacts (and derivative 'expert' opinions) in a context that is highly suggestive, likely to shape or cue perception and interpretations in ways that are difficult to anticipate, or regulate, by way of conventional trial safeguards. Significantly, it tends to downplay (or ignore) the difficulty of comparing and identifying strangers, and is often accompanied by the (doctrinally incoherent) expectation that the jury's own interpretation can stand in for a meaningful evaluation the expert's performance. This constrains (defence) attempts to convey the difficulties of interpretation, and, more critically, the epistemic limitations of the evidence. It is to the (lack of probative) value of this evidence to which we now turn.

3. Reliability and Technological Determinism

Historically, and implicit in the accommodating admissibility regimes outlined above, the knowledge claims produced by image analysts and adduced at trial by the state as incriminating opinion evidence have generally been accepted as reliable. The cosy symbiotic relations between police and security agencies, forensic analysts, prosecutors and judges have meant that the products of surveillance and their interpretations were largely taken on trust, even by defence lawyers (National Research Council 2009; Law Commission of England and Wales 2011). Investigators, prosecutors *and* judges have tended to be uncritical early adopters of identification technologies, mirroring perhaps political enthusiasm for CCTV systems and their rapid expansion. This ready conversion of surveillance artefacts into admissible, trustworthy evidence reflects technological determinism—with its associated expectations that technologies (and 'experts') have the capacity to (re)solve various problematics—itself problematised within Surveillance Studies (Bigo 2006; Haggerty 2006; Lyon 2007; cf. Gates 2011). Judicial accommodation may be linked not only to the increasing availability of images (and recordings) as potential evidence, but also the pervasiveness and investment in surveillance systems (e.g. CCTV networks) and public and political expectations, linked with high profile (outlier) 'successes' (e.g. Jill Meagher's case, see Levy 2012). These factors combine to make it difficult for courts to contemplate excluding intuitively relevant evidence, and raise questions about the surveillance imaginaries driving expectations about the utility of images and 'expert' interpretations within the trial. Although we are not directly engaged in assessing the effectiveness of CCTV systems—in terms of whether they do or can provide deterrence/prevention, security and crowd management, and so on—we are interested in understanding why they rarely operate in the manner hoped for (or intended). Reinforcing Surveillance Studies' attention to understanding the localised operation and competing dynamics of these systems (see e.g. Goold 2004; Smith 2008; Hier 2010; see also McCartney 2006) this analysis ought to extend to include the epistemic.

At one level, the reliance on putative 'experts' in the court could be read as an acknowledgement, or reaction to, the *inability* of the technologies to operate effectively in terms of identifying criminals or deterring criminality. But in this context there is a troubling tendency for courts to uncritically accept the claims made by 'experts'—that *they* can read the images, recordings and traces in ways that the lay decision maker cannot. There remains the danger of falling for facial recognition imaginaries: the idea(l) of an individuated algorithmic data double, mediated via an expertise that is itself imaginary (cf. Gates 2011). Surveillance Studies, in drawing attention to the complex ways that technological determinism can play out (e.g. Goold 2004), points to the need for caution when attempting to 'read off' technology and its artefacts. Our point is that this also applies to claims made in specific fields and by specific 'experts', as well as to claims made for the trial itself—as part of an assemblage that purports to embody certain normative and epistemic values. In this regard, technical limitations constitute an additional layer. It is not just that images are contextualised and interpreted within visual cultures that structure meanings, or presented to the fact-finder contextualised or contaminated by 'expert' opinion and other evidence, but

also that they may, *in fact*, be unintelligible or misleading.²⁰ In making these comments we accept that technical abilities (and imaginaries) may be refined over time. But our concern is the basic *indifference* to the value of incriminating opinion evidence: the drive to admit images and to rely on opinions derived from images before actual abilities have been studied or demonstrated.

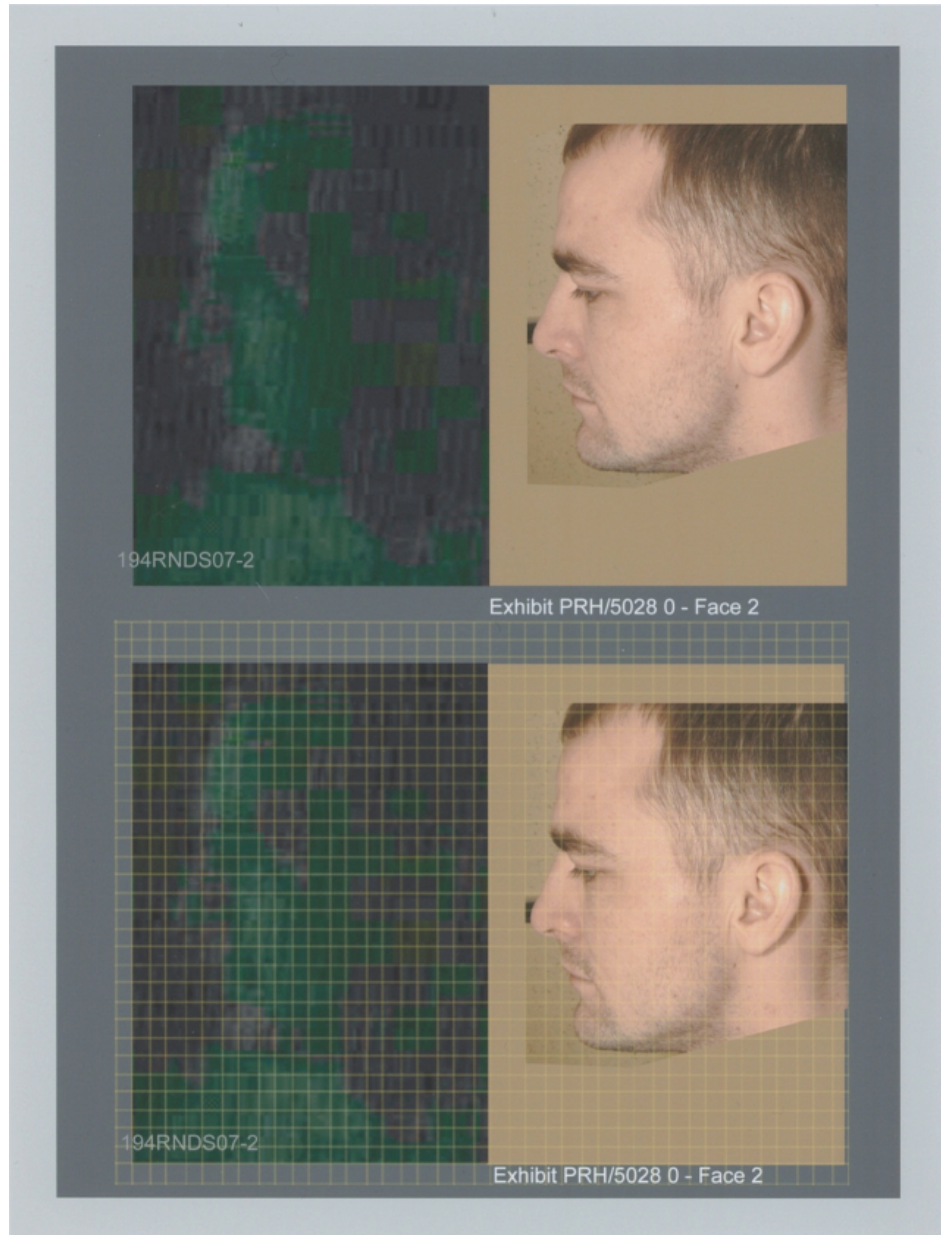


Figure 2. Images from Atkins v The Queen. Crime scene image (L) and image of the suspect (R) with grid (bottom) and without grid (top). The CCTV image on the left was compared by the analyst with the image of a suspect on the right—see Edmond, Kemp, Porter, Hamer, Burton, Biber and San Roque 2010. Images courtesy of Joe Stone.

When considering the use of images as the basis for ‘expert’ opinions there are significant technical and interpretive problems (Edmond, Biber, Kemp and Porter 2009; Edmond, Cole, Cunliffe and Roberts

²⁰ Similar points can be made about other techniques such as voice intercepts (e.g. *Eastman v The Queen*; *R v Galea*).

2013). The first concerns continuity of images and the ability to overcome a range of distortions. Police (and forensic agencies) tend to have weak protocols in relation to the collection and storage of images, especially in electronic forms (Porter 2012). None have techniques that enable the analyst to overcome the various forms of distortion associated with the capture of images—and potentially their transfer, playback and enhancement. This is a serious problem, because in interpretive exercises involving the comparison of two different things, usually a person of interest in an incriminating image against a reference photograph (but also two fingerprints or electropherograms), the ability to ascertain what the person of interest (or thing) in the image actually looks like is fundamental to the comparison exercise—see figure 2. Judicial responses to this failure tend to be limited to accepting the ‘expert’s’ bare assertion that they have taken account of the distortions (e.g. *Honeysett v R*). Secondly, ascertaining the *value* of ‘expert’ opinion evidence, requires some kind of empirical evaluation to determine whether the technique, including the interpretive process, actually *works*, along with some indication of accuracy and error (i.e. how well it works) (Tangen 2013; cf. Gates 2011). In the absence of such validation studies, which could tell us whether the expert can do as they claim, and how well they perform, we are obliged to take on trust the claims (accepted by courts) of those who present as ‘experts’, that their variously defined *experience* is sufficient to qualify them. However, experience in a cognate field, or in viewing images (repeatedly), or previous appearances in courts, are poor substitutes for empirical evaluation. And, successful prosecutions are no substitute at all. Thirdly, even when two things (such as facial features) *appear* similar, or even the same (in images), we have the problem of ascertaining the significance of this appearance. In addition to being able to account for continuity, quality and distortion (that is, are the similarities real or image artefacts), to attach *evidentiary* significance, we would need to know about the distribution of one or more features among the relevant population. How do we know that the point(s) of similarity are real and, if so, how (un)common are they?²¹ Where there is more than one point of (apparent) similarity, we also need to know about the independence of those features. If they are not independent then knowing about several features may in fact be no more discriminating than knowing about one. It may, however, (mis)lead interpreters, especially lay fact-finders in court, to equate reasonably common (and dependent) similarities with identity.

Finally, investigators and analysts rarely shield themselves from information that has the potential to contaminate their opinions.²² Exposure to such domain-irrelevant information has a demonstrated tendency to shape the interpretation of the analyst, even in circumstances where the underlying techniques are (otherwise) demonstrably reliable (Dror, Charlton and Peron 2006). The failure to disclose (or address) threats from contextual biases and cognitive processing is compounded to the extent that incriminating opinions are often represented as *independent* corroboration of guilt (Cunliffe 2013; Edmond, Searston, Tangen and Dror 2013). Further, where identification techniques are not demonstrably reliable, such interpretations are unlikely to correct, and indeed are likely to affirm, other misleading information and faulty investigative assumptions, such as mistaken eyewitness accounts or confessions procured under duress (Garrett 2011).

So, notwithstanding their routine use in investigations and admission in trials, in many cases we actually know very little about the validity of techniques used by these legally-recognised ‘experts’ or about levels of accuracy (and error). Our concern with the uncritical acceptance of surveillance artefacts and associated ‘expert’ interpretations as evidence finds support in scholarly challenges to many interpretive techniques (e.g. Risinger 2000; Saks and Koehler 2005) and also in the National Research Council’s (NRC) authoritative *Strengthening forensic science in the United States* report (National Research Council 2009; see also Expert Working Group on Human Factors 2012; Campbell 2011). Addressing many of the

²¹ Often this requires knowledge about population characteristics, such as the kinds of details assembled in databases. Many of the experts proffering opinions acknowledge that there are no meaningful databases available underpinning their opinions, see e.g. *Morgan v R*; *R v Dastagir*; *Atkins v The Queen*; *R v T*.

²² An example would be where fingerprint analysts are exposed to information about the offence and the prior criminal record of the suspect(s) whose prints are being compared. See Dror et al. 2006; Expert Working Group on Human Factors 2012.

technical and interpretive problems outlined above, including the problem of contextual bias, the NRC report explicitly questions the evidentiary *value* of many of the forensic sciences based on comparison (or pattern recognition):

With the exception of nuclear DNA analysis, however, *no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source.* ... The law's greatest dilemma in its heavy reliance on forensic evidence, however, concerns the question of whether—and to what extent—there is science in any given forensic science discipline.

(National Research Council 2009: 7-9, emphasis added)

These findings are both revealing and unsettling. The NRC report represents a surprisingly critical response to surveillance techniques *in routine use*, and captures the light that scientifically-predicated DNA techniques have cast on the other *identification* 'sciences' (Lynch 2004). It is revealing to contrast the validation studies and sophisticated statistical work on population that have accompanied the largely extra-legal negotiations surrounding the refinement of DNA evidence (following initial legal scepticism in relation to DNA evidence) with the reception of many other forms of incriminating 'expert' comparison evidence—such as interpretations of images, ballistics, tool marks, handwriting, bite marks, gait, foot print, ear print and tyre mark comparison, and so on. Without wanting to suggest that DNA processes are necessarily infallible or even a 'gold standard' to be faithfully emulated, to varying degrees, non-DNA techniques have yet to produce, and courts *yet to stipulate* the need for, independent evidence of reliability. And curiously this accommodating legal posture pre-dates and survives the emergence and reform of DNA profiling. Rather than require empirical support for interpretive techniques and expressions underpinning incriminating prosecution evidence, courts in most common law jurisdictions (including the US and Canada, with reliability-based admissibility standards; see *Daubert v. Merrell Dow Pharmaceuticals, Inc.*) have preferred to 'grandfather' longstanding techniques (e.g. latent fingerprint comparison), accept witnesses with investigative experience or broadly relevant qualifications, and have relied on the deconstructive abilities of poorly-resourced defence lawyers as the primary means of identifying and explaining evidentiary limitations to lay jurors (and judges). Moreover, once a technology or derivative interpretive technique is admitted in one jurisdiction admission tends to follow in others. Conditions imposed on the initial admission are frequently elided in subsequent decisions, thereby facilitating technological (and evidentiary) creep and threatening the standard of proof (Risinger 2000).

In the absence of validity and reliability studies (or independent evidence of proficiency), admission and convictions (however obtained) do not necessarily (and should not be used to) support the value of surveillance technologies and interpretations considered 'expert' for legal purposes. Historically few forensic analysts had scientific training or the requisite skills to recognise (or address) the magnitude of methodological problems (Mnookin et al. 2011). But there are fairly standardised methodological tools that could be used to assess many of the surveillance techniques and derivative opinions in routine use. We could, for example, study the ability of those involved in image comparison—in case-like conditions where the correct answers are known—in order to ascertain validity and reliability across a range of conditions (Tangen 2013). *Most* techniques and 'experts' are yet to be subjected to such informative analyses.²³ Provisionally we acknowledge that in some circumstances fairly low levels of probative value may assist with an investigation (or lend support to an otherwise strong circumstantial prosecution). It might, for example, be acceptable to tolerate high levels of error in the preliminary stages of an investigation (or when other leads have run 'cold'), especially if those involved in investigations have an appreciation of the limits of techniques and the risks posed by false leads and misidentifications. The same levels of error may, however, be unacceptable in a criminal prosecution, where rules—inflected by

²³ Significantly, the first ever validation studies for latent fingerprint comparison took place in 2011.

obligations to the accused—should be more onerous (or constraining). In the trial context, in particular, it is important to have a much clear(er) understandings of the limits of technologies, to fully disclose limitations to those managing the admission and use of the evidence, as well as those engaged in assessing it. In the absence of such indicative information it is very difficult, if not impossible, to make an informed assessment of the value of these incriminating opinions.

4. Pyrrhic Protections: Trial safeguards and appeals

Questions about the reliability of expert opinion evidence would be less problematic if the trial was effective at identifying and conveying problems and their implications to those responsible for assessing the evidence (McQuiston-Surrett and Saks 2008; Edmond and San Roque 2012). Unfortunately, adversarial proceedings and conventional safeguards—including prosecutorial obligations, admissibility decision making, cross-examination, the use of rebuttal experts and judicial directions and warnings—have proven remarkably ineffective at exposing fundamental problems with surveillance technologies, that is, the kinds of issues raised in the previous sub-section.²⁴ Because courts in most advanced Western democracies have been inattentive, and apparently oblivious, to the serious problems with opinions pertaining to images (and many other forms of comparison evidence), trial and appellate safeguards do not afford credible protection (Law Commission of England and Wales 2011). The NRC report embodies a deep scepticism about legal responses to date:

The report finds that the existing legal regime—including the rules governing the admissibility of forensic evidence, the applicable standards governing appellate review of trial court decisions, the limitations of the adversary process, and judges and lawyers who often lack the scientific expertise necessary to comprehend and evaluate forensic evidence—is inadequate to the task of curing the documented ills of the forensic science disciplines. This matters a great deal, because ‘forensic science is but the handmaiden of the legal system’.²⁵

We cannot underestimate the significance of the failure of lawyers and judges to appreciate that many forensic science techniques have never been credibly evaluated and opinions are rarely generated in conditions that are likely to reduce notorious threats to cognitive processing and cross-contamination. The fact that incriminating ‘expert’ opinions are not necessarily the product of reliable and independent processes, or that the analyst has been exposed to domain-irrelevant information, is not routinely conveyed, effectively or otherwise, to decision-makers (Edmond, Searston, Tangen and Dror 2013). Further, incriminating opinions risk being transformed into a type of evidence that appears to be independently corroborative of the investigation, rather than generated via the investigation. In these circumstances there are very real risks that fact-finders will misunderstand (and particularly overvalue) the (unknown) probative value of the ‘expert’s’ opinion.

The conventional trial is poorly equipped to deal with the complexity of methodological criticisms and many forms of statistical evidence and reasoning, or the difficulty of uncovering problems (including contamination and bias) retrospectively and in the absence of documentation. It requires lay persons to assess ‘expert’ opinion evidence in an environment where other incriminating evidence (and the accused’s prior criminality) is (often) admitted and used to supplement weak or speculative incriminating opinions. Emerging anxieties about the interpretation of images has led to limited judicial intervention—but this has been primarily via endeavours to regulate the *expression* of opinion rather than contemplate excluding the

²⁴ On the use of rebuttal or defence experts, see Lynch and Cole 2005 and Cole 2009.

²⁵ NRC Report, 85, 96. See also 12: ‘The adversarial process relating to the admission and exclusion of scientific evidence is not suited to the task of finding “scientific truth”’.

incriminating opinions (Cole 2011). Thus judicial restrictions often limit ‘expert’ testimony to the description of features said to be shared by the suspect and the person of interest in the relevant images, but across common law jurisdictions, legal responses have been inconsistent and arguably incoherent (Edmond, Cole, Cunliffe and Roberts 2013).²⁶ Such admissibility compromises fail to attend to the issue of whether the ‘expert’ can do what they claim, how accurately and on what basis we can be confident, nor do they engage with the difficulties of conveying to the fact-finder the (weak) probative value of *apparent* similarities (Edmond and Kemp forthcoming) or the uncertainties concerning expression of results more generally (Martire, Kemp and Newell 2013; McQuiston-Surrett and Saks 2009). The limited value of conventional safeguards is compounded by the imbalance of resourcing between prosecutors and defence counsel, the (near) monopoly of many types of ‘expert’ evidence and experience by the state (e.g. latent fingerprint analysts), excessive trust in the state’s police and investigative agencies, a history of liberal admission and widespread public confidence in the forensic sciences.

Finally, it is worth emphasising that, with a few exceptions, courts of appeal have adopted a soft touch to the review of admissibility decisions (e.g. *Honeysett v R*; *Atkins v The Queen*). This is largely because of their ongoing and obdurate confidence in trial mechanisms and the tendency to consider mistaken decisions through the lens of whether the conviction was safe, rather than whether the admission of incriminating ‘expert’ opinions of unknown value were productive of substantial unfairness to those accused (Garrett 2011). This provides few incentives for police officers and forensic scientists to refine their techniques or concede methodological problems, in the face of weak challenges and an accommodating jurisprudence. Further it tends to reinforce the tautological reliance by investigators and ‘experts’ (and judges) on success in securing guilty pleas and convictions as surrogates for the reliability of techniques and their derivative interpretations (e.g. *Morgan v R*).

5. Co-production: Social order through law-‘science’ knowledge products

In this paper we have been concerned with how surveillance practice is enabled and, in particular, with what types of evidence gathering and surveillance practices (and legal rituals) flow from the inclusionary orientation and associated (de)regulation of ‘expertise’ within the courtroom. The result of such deregulation is that in relation to many forensic science techniques, including those relating to the interpretation of images, we do not have a clear idea about their epistemic worth. Many of the technological assemblages used routinely for surveillance, in investigations and as evidence in criminal proceedings are not reliable or, to put this less powerfully, are not as unproblematic as routinely represented by the media, investigative agencies, industry advocates, and understood by prosecutors, judges and jurors. Our example of images suggests that the ability of those trying to ‘watch’ may be more circumscribed than is popularly imagined—even by those doing the watching. The inattention to the actual evidentiary value (and not just admissibility) of this evidence seems to have been an oversight by surveillance scholars as well as lawyers and judges.

The proliferation, reproduction and circulation of surveillance images, together with the legal recognition of ‘expertise’ in image interpretation, provides an example of the kinds of law-‘science’ co-production that help to stabilise social order (Jasanoff 2006); in this case, the identification of those alleged to be criminals—whether actually or potentially. The individuals involved in interpreting images for criminal justice purposes, whether as intelligence or evidence (and this is not always a clear divide) have become ‘experts’ through legal recognition—whether via formal qualification or accrued experience. In effect, legal institutions are implicated in the *creation* of fields of knowledge that may have no independent existence beyond criminal justice systems. Facial mapping and body mapping are socio-legal creations, co-produced in response to the proliferation of cameras and images, the exclusion of the opinions of police

²⁶ This incoherence is compounded in cases where the *same* ‘expert’ is prohibited from giving evidence as a ‘facial mapper’ or ‘body mapper’, but then permitted to give evidence as an ‘ad hoc’ expert (e.g. *R v Tang*, and see also *Honeysett v R*).

officers (in some jurisdictions), the difficulty of encouraging familiars (e.g. family members) to provide incriminating identifications, the unruliness and ambiguity of images, and the perceived need to facilitate the interpretation of potentially ambiguous images in investigations and trials.²⁷ While the idea of co-production is ordinarily used analytically (or descriptively) it does have normative potential. Some forms of co-production might be characterised as *pathological*—the rapid take up of facial (and body) mapping has occurred without genuine attempts to undertake the kinds of evaluation that we might expect from legal systems with espoused commitments to truth and justice.

Thus far, this paper has assumed a somewhat unreflexive approach to the validity and reliability of evidentiary products. This is in part a reflection of the models of science and expertise that underlie the use of surveillance texts within the criminal justice system. More significantly, it is an approach that responds to the premium purportedly placed upon accuracy and fairness within the criminal trial, indexed to the frailty of many surveillance assemblages and emerging evidence about the weakness of criminal trial safeguards. We accept that the meaning of reliability is a social accomplishment, unavoidably extending beyond experts and domains of expertise to incorporate social, institutional, ideological, practical and technological dimensions (Bijker, Hughes and Pinch 1987). Rather than adopting an essentialist or technocratic approach to the meaning of reliability or the effectiveness of a technology, we encourage analysts to shift focus to the particular use, institutional values and traditions and even the way negotiations around the meaning and use of technologies ought to be conducted—in *particular settings* (Latour 1987). In this example, analysis must take into account criminal justice values and principles in combination with sensitivity to the frailties of criminal proceedings. It is our contention that the state should be able to satisfy a reasonably onerous (admissibility) standard—guaranteeing basic reliability—before interpretations derived from surveillance assemblages are admitted as incriminating evidence to assist with proof of identity and guilt.

In this respect we can return to the idea of surveillance *assemblages* to help us understand and assess the potentially pathological, mutually constitutive, practices of investigators, forensic scientists and lawyers. This requires us to recognise the combination of machines/equipment, techniques, procedures (all potentially *actants*), individuals, institutions, training, traditions and even cultures, as forming part of the assembly of constituent actors and factors structuring the way in which interpretive practices are performed, incorporated and understood. Although many of the constitutive dimensions of image *expertise* and *evidence* tend to be omitted or elided in formal settings, their reintroduction provides a useful way of approaching the construction of surveillance and evidentiary artefacts and their *potential* to be opened-up and pulled-apart (or deconstructed, after Jasanoff 1995) in legal proceedings. The idea of the assemblage, always combining human users, technologies, institutions and traditions, reinforces the inescapability of human participation and the need for subjective input (e.g. collection and interpretation) across the forensic sciences. There is no system/assemblage separate from the analyst (or designers) or decision makers, and the interpretation and opinion of the operatives is not only part of, but often one of the major systemic limitations. Applying this perspective to the forensic setting foregrounds the (often obscured) interpretative dimensions and associated risks of error that can arise across the spectrum of activities, from the recognition and collection of traces, to their analysis, to attempts to ascribe significance or understand the trace and any attendant opinions in the context of a case or administrative process.

Considering this lack of attention to the interpretive dimension and epistemic value, particularly the uncertain validity and reliability of many surveillance techniques in routine use, we wonder about the use of terms such as ‘intelligence’ and ‘evidence’, particularly in a context experiencing an increasing criminalisation of attitudes, values and vague preparatory acts. Such terms are question begging: requiring further discussion about whether claims can be sustained and the kinds of models of science, technology

²⁷ Fingerprint comparison is another example of such a field that grew up almost entirely due to criminal justice issues.

and expertise that might be used to support and understand their use in particular contexts and for specific uses. In theory, there seem to be spectrums from *uncertainty* (or ignorance) to *certainty*, with 'intelligence', 'evidence' and 'proof' each respectively situated further along the spectrum toward 'certainty' (Edmond and Cole 2013). But without wanting to dismiss the value of epistemic continuum(s), in practice it will often be difficult to know precisely where techniques of interpretation might sit. For the criminal justice system there are risks, and a corresponding need for caution, if the probative value of the products of surveillance technologies is low or unknown—located toward the 'uncertainty' end of a spectrum. As a matter of principle, criminal proceedings should be organised in a manner that embodies the desire for factual accuracy and fairness as well as the express commitment to avoid convicting the innocent. Intelligence gathering and criminal investigations are not, for good reasons, constrained in the same way. While it is important to insist on imposing and enforcing appropriate limits upon state surveillance practices, we also acknowledge the significance of surveillance for many successful investigations. Problems emerge, however, when a range of speculative and error prone technologies are relied upon uncritically by investigators and/or used as probative evidence in criminal proceedings.²⁸ Regardless of the nomenclature, there may be differences in the suitability of particular techniques, of varying degrees of reliability, to investigations as opposed to trials and criminal proof. Because of a range of explicit commitments and obligations—embodied in rules and procedures, criminal justice values and principles, as well as other constitutional and human rights protections—courts ought to be constrained in the types of techniques and interpretations they admit as proof in criminal proceedings, and this may extend to excluding the artefacts themselves (e.g. the incriminating images) from criminal proceedings.

In concluding, it is also worth considering resistance. As in other contexts, some of those involved in monitored and/or illegal activities have actively resisted the various surveillance technologies, almost from the outset (Scott 1985, 1998; Haggerty and Ericson 2006; Lyon 2007; Marx 2009). From donning gloves to disguises, individuals have attempted to avoid leaving readable traces.²⁹ But the issue, as we have endeavoured to illustrate it, is even more complicated, in part because of the largely under-appreciated difficulty of reading traces in reliable and trustworthy ways. Resistance is not only encountered in the deliberate activities of those who anticipate being observed or traced, but also in the complex assemblages themselves. This applies to the many limitations embedded in the systems—routine and targeted surveillance can be boring, repetitive, and undifferentiated, and what is captured will be partial (Goold 2004; Smith 2008; Hier 2010)—but also in the attribution of meaning. In all of the cases we refer to, the images, voices, documents and other traces are ambiguous and often (if only by virtue of the not guilty plea) contested. Many of the techniques developed to read traces are limited, offering only fragmentary glimpses in conditions where it is difficult to assess their actual value. In many areas we have more data than we can use—reliably or otherwise. Forensic abilities almost always operate below imaginations and imaginaries—consider CSI—and are inescapably dependent on human interpretative mediation. Our criminal justice systems have not dedicated the necessary attention to the downstream uses and actual value of surveillance artefacts, preferring to rely upon the trial as an effective instrument for deconstructing and revealing the limitations of the assemblage.

Finally, although problems with forensic science are widespread, there is, we would contend, something special about (surveillance) images; that they are often presented as or assumed to be accessible to the fact-finder occludes their power to persuade and mislead, as well as their generalised *unintelligibility*. As more and more images and videos enter legal proceedings, there is a need to re-consider their presentation and use. We do not have mechanical means of interpreting images, nor techniques that are capable of

²⁸ A further dimension worth noting is that availability of surveillance evidence can have an impact in the context of charge negotiations (plea bargaining) and further that misidentifications based on *unreliable* evidence leave the real offender at large.

²⁹ Though resistance can also manifest in an indifference to surveillance, a concomitant lack of modification in (undesirable) behaviour despite that monitoring, or even an escalation of such activities (Lyon 2007; Muir 2009). Many criminal acts will be performed directly, potentially even deliberately, in *front* of cameras, or discussed *despite* the knowledge of audio monitoring (Marx 2009; e.g. *R v Madigan*).

constraining interpretations. Problems with image hermeneutics are compounded, profoundly, by their integration with sounds, suggestion and other evidence, particularly the reliance on ‘expert’ narration. Valuable resources can be drawn from Surveillance Studies to help us to understand the dynamics that inform the easy reception of images as evidence, but Surveillance Studies can also be enriched by a more nuanced understanding of the epistemic limitations inherent in many forms of surveillance, as well as in the process of the contemporary criminal trial. Criminal trials, as currently organised and resourced, are not well suited to facilitate an informed assessment of the value of surveillance techniques or to provide a framework from which to assess or manage the type of scrutiny that has preceded the presentation of a text or ‘expert’ translator. The complex assemblages behind the construction of incriminating opinions—often obscured or ‘black boxed’—should not be left to criminal defendants and their overloaded defence attorneys, in the face of ‘favourable’ plea offers, to contemplate unpacking (or deconstructing) in the risky realm of an adversarial criminal prosecution. While legal institutions and personnel should continue to regulate admissibility decision-making, scientists, forensic analysts and lawyers (and perhaps even surveillance scholars) should be collectively involved in negotiating standards and practices beyond the courtroom (e.g. National Research Council 2009). This will not remove controversy around expert opinion evidence from legal settings, but it will help to relieve legal proceedings and personnel of a burden they have been unable to fulfil for more than a century. It *may* also slowly transform the way surveillance is implemented and understood upstream.

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