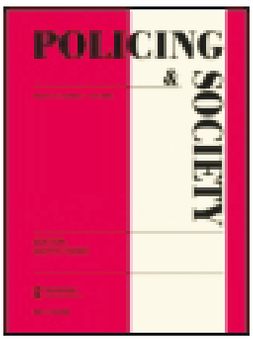

Routledge
Taylor & Francis Group

Policing and Society
An International Journal of Research and Policy

ISSN: 1043-9463 (Print) 1477-2728 (Online) Journal homepage: https://www.tandfonline.com/loi/gpas20

Making the material routine: a sociomaterial study of the relationship between police body worn cameras (BWCs) and organisational routines

Keith Guzik, A. Sesay, O. Oh, R. Ramirez & T. Tong

To cite this article: Keith Guzik, A. Sesay, O. Oh, R. Ramirez & T. Tong (2019): Making the material routine: a sociomaterial study of the relationship between police body worn cameras (BWCs) and organisational routines, Policing and Society, DOI: 10.1080/10439463.2019.1705823

To link to this article: https://doi.org/10.1080/10439463.2019.1705823

Published online: 23 Dec 2019.

POLICING AND SOCIETY
https://doi.org/10.1080/10439463.2019.1705823

Routledge
Taylor & Francis Group

Making the material routine: a sociomaterial study of the relationship between police body worn cameras (BWCs) and organisational routines

Keith Guzik[a], A. Sesay[b], O. Oh[c], R. Ramirez[c] and T. Tong[d]

[a]Department of Sociology, University of Colorado Denver, Denver, CO, USA; [b]Department of Management Information Systems, University of Georgia, Athens, GA, USA; [c]Department of Information Systems, University of Colorado Denver, Denver, CO, USA; [d]Department of Strategy & Entrepreneurship, University of Colorado, Boulder, CO, USA

ABSTRACT

This article employs a sociomaterial perspective adapted from information systems and management studies to examine the potential impact of body worn cameras (BWCs) on police organisations. Based on 42 semi-structured interviews with police employees, the study illustrates how wearable camera technology is seen to 'afford' officers and agencies the ability to modify their work routines. Further, these modifications occur in conjunction with particular dimensions of body camera system's material agency. Through the *performativity* of video recording devices to move, see, hear, and record, officers report altering how they approach patrol work by displacing certain tasks onto their material associates, which allows them to better carry out their duties. Through the *interoperability* of the cloud storage systems, departments describe being able to reorganise critical information processing routines in support of criminal prosecutions. Through the *objectivity* of the digital files produced by body-worn camera systems, departments note effortlessly creating packets of events bearing the impression of truth and legitimacy with which they are able to more easily resolve citizen complaints. These findings underscore the importance of remaining attentive to the materiality of technology in policing and law enforcement research.

ARTICLE HISTORY
Received 7 July 2019
Accepted 12 December 2019

KEYWORDS
Policing; technology; organisational routines; body worn cameras; sociomateriality

Introduction

Technology constitutes policing. From the use of call boxes in support of foot patrols during the political era of policing (Kelling and Moore 1988) to the introduction of Compstat to visualise local crime trends in the community problem solving era (Bain 2016), the tools and techniques of policing have served to organise police work itself (Byrne and Marx 2011). Policing today encounters a new generation of innovative and connected information and communication technology (ICT) solutions that can seamlessly aggregate and share information across databases and platforms, predict criminal offending, and automatically identify people and property (Stanley 2017). The immense power of these new technologies to collect, store, process, and analyse data promises to remake the organisation and process of policing in myriad ways (see, for instance, Brayne 2017).

The adoption of wearable camera solutions by police agencies is representative of this trend. A relatively simple technology allowing for the creation, storage, and sharing of video records of

CONTACT Keith Guzik keith.guzik@ucdenver.edu

officers' work, cameras are believed to hold a transformative potential by deterring misconduct by both officers and citizens, expediting the resolution of civilian complaints, producing evidence, and supporting officer training and/or remediation (Mateescu et al. 2015, White 2014). The implementation of wearable cameras represents a considerable expense for departments, however, in terms of both the direct costs of purchasing the technology and the indirect costs of storing, managing, retaining, and sharing video footage (Bakardjiev 2015, Harvard Law Review 2015). Effectively managing BWCs and the digital artifacts they create could also bring about new work roles for departments to fill, new skills for frontline officers to master, and new relationships with external actors (such as vendors) to maintain. Wearable cameras can thus be expected to have profound consequences for the organisation of policing. Unfortunately, little research has examined the topic directly (see Lum et al. 2019, Koen, Willis, & Mastrofski 2019, Lum et al. 2015).

This article advances research on the prospective relationship between ICT and policing by considering the experiences of United States (US) police agencies with body cameras from a sociomaterial lens. Sociomateriality, a theoretical perspective drawn from information systems (IS) and management studies, highlights the constitutive entanglement of social and material relations within work settings (Leonardi and Barley 2010; Orlikowski and Scott 2008). The article demonstrates the potential of sociomateriality to inform criminological research involving technology topics through an analysis of 42 semi-structured interviews with police officers from six different police agencies in the Rocky Mountains/High Plains region of the US.

The interview data illuminate two central points concerning the potential role of innovative ICT in policing. First, body cameras and the broader technological system supporting them have significance for officers and other police personnel by 'affording' (Leonardi 2011) them the ability to modify key *routines* (Feldman and Pentland 2003, Feldman 2000) through which police work is accomplished. Second, these modifications in police routines are seen tied to particular dimensions of the *material agency* (Robey, Anderson, and Raymond 2013, Pickering 1995) of wearable camera systems. The *performativity* of cameras to move, see, hear, and record, for instance, enables patrol officers to alter their interactions with citizens and suspects by 'displacing' (Latour 1999) certain tasks onto their material companions, thus allowing them to better concentrate on other responsibilities. The *interoperability* of digital storage systems across different file formats and work spaces can buttress departmental efforts to reorganise critical information processing routines in support of criminal prosecutions. The *objectivity* of digital audiovisual files, expressed in the instantaneous creation of memorialised 'packets' (Tiwana 2013) of policing actions that are accepted by the police and public as impartial representations of the truth, allows departments to amend complaint processing routines and reduce the likelihood of citizens pursuing complaints. Taken together, this sociomaterial analysis offers a novel interpretation of BWC impacts on police organisations and identifies new lines of investigation for future research on wearable cameras and other ICT innovations in policing.

To present these ideas, the article is structured into four main sections. It begins with a review of BWC and sociomateriality literature. It then describes the methods and data used in this study. Findings are presented next, grouped according to routine and materiality: specifically, patrol work and camera performativity, media duplication and storage system inter-operability, and complaint processing and file objectivity. It then concludes with a discussion of the significance of the results and their interpretation for future research on BWCs and new crime control technology.

Overview

Studying the Impact of Wearable Cameras on Policing

Outfitting patrol officers with wearable cameras in the US is a response to public demands for accountability following a number of high-profile civilian killings by the police (Fan 2018). The adoption of BWCs has been welcomed by activists, advocacy groups, elected officials, federal judges, and police chiefs (Mateescu et al. 2015), although officers have at times been less supportive (White 2014). This

support speaks to the considerable promise stakeholders see in the technology to deter misconduct by both officers and citizens, expedite the resolution of civilian complaints, produce evidence aiding the prosecution of crimes, and support training for new recruits or officers in need of remediation. These benefits are balanced against the potential costs of adopting BWCs, including threats to the privacy of citizens and officers and the considerable tangible expenses associated with the technology such as technology adoption, digital video storage, and digital footage processing (Harvard Law Review 2015, Bakardjiev 2015, Mateescu et al. 2015, White 2014).

A growing body of research has informed the discussion on BWCs. Researchers have focused attention on how body cameras affect the conduct of officer-citizen contacts and have generally found that recording interactions serves to reduce the use of force by police (Sutherland et al. 2017, Jennings et al. 2017, Henstock and Ariel 2017, Ariel et al. 2016a, 2016b, Ariel et al. 2015), citizen resistance to officers (Jennings, Lynch, and Fridell 2015), and citizen complaints (Braga et al. 2018, Hedberg et al. 2016, Grossmith et al. 2015).[1] In terms of police discretion, studies have found that body cameras increase the number of citations (Braga et al. 2018, Ready and Young 2015), arrests (Braga et al. 2018, Katz et al. 2014), criminal charges (Owens, Mann, and McKenna 2014), and guilty pleas (White, Todak, and Gaub 2018, Morrow, Katz, and Choate 2016) resulting from police contacts. Others, however, have found no impact on similar measures (Hedberg et al. 2016, Grossmith et al. 2015).

Research suggests that the impact of camera technology is tied to operational contexts (Newell 2014). The deterrent effect of BWCs rests on the cameras being worn and activated and citizens being aware of their presence (Ariel et al 2016a, 2016b). Given these contextual factors, scholars emphasise the need for strong policies that would require officers to activate their cameras and notify citizens that they are being recorded (Ariel et al. 2016a, Young and Ready 2016)[2], oblige departments to retain more types of BWC footage for longer periods (Fan 2018), and expand public access to footage (Joh 2016).

These findings suggest the importance of how officers view the technology. Non-compliance with activation policy, for instance, might be explained by organisational culture (Hedberg et al. 2016, see also Alpert and McLean 2018). Patrol officers with experience wearing BWCs, however, feel the technology helps them improve evidence collection and report writing (White et al. 2018, Gaub et al. 2016, Jennings, Lynch, and Fridell 2015, Jennings, Fridell, and Lynch 2014). Citizens with a recent BWC-recorded police contact also express satisfaction with how they were treated and have positive attitudes about BWCs overall, suggesting a relationship between BWCs, procedural justice, and police legitimacy (White, Todak, and Gaub 2018, 2017).

While these findings address important questions regarding whether body cameras meet their intended goals, research has tended to overlook other concerns; for example, the relationship between the technology and police organisation, including impacts on supervision, management, and disciplinary systems, officer training and remediation, and investigation of critical incidents (Lum et al. 2019, Lum et al. 2015). A recent article by Koen, Willis, and Mastrofski (2019) opens important ground in this area, finding that cameras enhance those organisational processes which have 'tangible goals and well understood means for their accomplishment' (e.g. report writing, law enforcement, resolution of civilian complaints) (p. 1). Processes that are less technically defined meanwhile, such as supervision and training, are largely left unchanged by the technology (Koen, Willis, and Mastrofski 2019). But there otherwise remains a dearth of research on the possible organisational effects of BWC technology adoption. In this article, we build on this underexplored but critical area of investigation by stepping outside criminology to consider insights on the interaction between technology and organisations drawn from the information systems (IS) and management literatures.

Sociomateriality

'Sociomateriality' is a theoretical approach for studying technology that emphasises the interconnectedness of material and human capabilities (Leonardi and Barley 2010, Orlikowski 2009, Orlikowski and

Scott 2008). Through in-depth examinations of technologies in practice, such as mobile email devices in the workplace (Mazmanian, Orlikowski, and Yates 2013), and social media platforms in the hospitality industry (Scott and Orlikowski 2014), sociomaterial studies emphasise the materiality of digital technologies in constituting, rather than simply supporting or mediating, organisational work patterns. The material capabilities of technology can offer organisations both 'affordances' ('different possibilities for action based on the contexts in which they are used') and/or 'constraints' (obstacles to 'their ability to carry out their goals'), either of which can result in modifications to their 'routines' (Leonardi 2011). Sociomaterial studies make a critical break from prior research that assumed a conceptual distinction between the social and the technical[3] and fill a gap in IS and organisational research where 'materiality has been historically neglected' (Robey, Anderson, and Raymond 2013).

Sociomateriality holds the potential to contribute to criminological and policing research by reorienting our understanding of the relationship of technology to work settings. Criminological research has traditionally, like the social sciences more broadly, not considered the material specificity of technological artifacts. Technologies, such as call boxes and two-way radios connecting patrol officers to supervisors (Kelling and Moore 1988, Bryne and Marx 2011), or computer and digital information technologies identifying crime 'hotspots' (Bain 2016), are often taken as an 'exogenous force' (Orlikowski 2009) shaping police organisations and practice. Similarly, BWC studies that explain changes in officer and/or citizen conduct through deterrence theory (Tankebe and Ariel 2016, Hedberg et al. 2016, Henstock and Ariel 2017) and dramaturgical theory (see Ariel et al. 2018, Sandu and Haggerty 2017, Sandu 2016) understand body cameras as an external, 'neutral third eye' (Ariel et al. 2015) that can be plugged into an organisation in order to effect changes in employee behaviour.

But understanding the relationship between the capabilities of material artifacts and the cultural forces of humans as an 'entanglement in practice' (Orlikowski 2009:12) means particular organisational forms and practices are often only specified through time and practice. This process-based perspective privileges neither the material nor the human, and instead focuses on how both contribute to outcomes in organisational and social practice. For a study of police body-worn cameras, the sociomaterial perspective would encourage us to consider *how the materiality and/or design of technology constitutes police organisation and operations*. How does camera technology work, and what does it do? How does the design of camera technology 'prescribe' (Akrich 1992) behaviour by users and organisations? How do cameras alter established ways of policing? How does the materiality (bulk, dimensions, weight) of cameras constitute officers' normal way of doing things? And how, if at all, are the police able to 're-purpose' or 're-inscribe' (see Jarzabowski and Pinch 2013) cameras for other goals and functions?

Methods and data

To explore our primary research question – *how does the materiality and/or design of technology constitute police organisation and operations?* – we conducted semi-structured interviews with 42 police employees from six departments in the Rocky Mountains/High Plains region of the US. The interviews were collected as part of a first-wave of data collection supporting a larger national survey that our research team is conducting on the organisational impact of police BWCs. Sampling for the study involved a purposive design intended to capture variation in municipality, departmental size, and officer rank. Recruitment was facilitated by one member of our research team who worked in a municipal government in the region. Key personnel responsible for administering their departments' body-camera programmes (such as IT officers or deputy chiefs) were identified by police executives, and our team was invited to interview them. Depending upon the department, patrol officers and sergeants were recruited either directly by team members at police headquarters during officers' off time or indirectly by supervisors encouraging their participation. The six departments who participated in this phase of the research were[4]: University Town, a medium-sized city home to a major university; College City, another medium-sized city home to a major university; Planestown, a small,

working-class town near a large meatpacking facility and home to a sizeable Latino population; Dry Pines, a middle-class suburban town bordering a city; Southview, a small, higher-income city suburb; and Kentridge, a larger, higher-income city suburb (see Table 1 for a more detailed description of participating departments). The 42 employees interviewed in this study included 15 patrol officers, 8 patrol sergeants, 1 lieutenant, 2 detectives, 1 patrol commander, 3 deputy chiefs/chiefs, and 12 officers and staff with other duties (administration, community resources, evidence, public relations and IT). Table 2 provides a more detailed description of participating employees.

Interviews were conducted at the officers' departmental headquarters and lasted around one hour on average. The interview protocol included topics culled from existing body-camera literature as well as others reflective of the sociomaterial perspective informing our study: *How do the cameras work? How are videos labelled, uploaded, stored, and accessed from the cameras? Is the video software system a stand-alone system or does it communicate with other management systems? What has been your experience with BWCs (both positive and negative)? How have BWCs changed the way you think about your work or policing in general?*[5] The sessions were audio recorded and later transcribed through a professional transcription service. Following transcription, the data were analysed and coded separately by 2 team members using NVivo and later compared by a third team member to ensure reliability.

Findings

The semi-structured interviews with police personnel identified a range of perceived impacts associated with wearable camera technology, from threats to citizen and officer privacy to the immense costs of storing camera footage. But in responding to our questions, many respondents gravitated to describing changes in their daily work routines. Routines are 'a repetitive, recognizable pattern of interdependent actions, involving multiple actors' (Feldman and Pentland 2003), that are 'situated' in time and space (Feldman et al. 2016). As recent work in organisational studies has emphasised, these patterns of action have a distributed character across both human and material actants (see Scott and Orlikowski 2014). Our interviews highlight the role that 'artifacts' (Pentland and Feldman 2005), in this case body-worn cameras and the technological platform supporting their operation, can play in the reproduction and redefinition of critical policing routines. In addition, they illustrate how modifications in routines are tied together with the 'material agency' (Pickering 1995) of particular components of BWC systems. That is, routine modification results not simply from the presence of

Table 1. Description of participating departments.

Characteristics	College City	Planestown	University Town	Dry Pines	Southview	Kentridge
Approximate Population	~100,00	~20,000	~100,00	~30,000	~10,000	~50,000
Identity	University Town	Town	University Town	Town	Suburban	Suburban
Median household income	~$60,000	~$50,000	~$60,000	~$60,000	~$115,000	~$105,375
Racial/Ethnic Origin (white alone)	White 81%; Black 1%; Hispanic 9%; Asian 5%	White 50%; Black 0%; Hispanic 45% Asian 2%	White 81%; Black 2%; Hispanic 11%; Asian 3%	White 60%; Black 11%; Hispanic 20%; Asian 3%	White 78%; Black 2%; Hispanic 7%; Asian 11%	White 82%; Hispanic 9%; Asian 4%; Black 2%;
Civilian Oversight/ Monitor	Yes	No	No	No	No	No
Approximate Number of Police Employees	~300	~40	~300	~50	~50	~115
Number of BWCs	150	29	61	50	34	65

Table 2. Description of participating police employees.

Name	Department	Position	Race	Gender
Specialist Hanson	Dry Pines	IT Specialist	White	Male
Specialist Lawrence	College City	Administrative Specialist	White	Male
Specialist Sampson	College City	IT Specialist	White	Female
Specialist Jenkins	Kentridge	IT Specialist	White	Male
Specialist Silkes	Kentridge	Public Relations	White	Male
Technician Rooks	Kentridge	Media Duplication	White	Female
Manager Toland	Kentridge	Evidence Manager	White	Female
Manager Knox	Kentridge	Records Manager	White	Female
Officer Anderson	Southview	Patrol Officer	White	Male
Officer Blake	Southview	Patrol Officer	White	Male
Officer Collins	Dry Pines	Patrol Officer	Black	Female
Officer Devins	Dry Pines	Patrol Officer	White	Male
Officer Estes	Planestown	Patrol Officer	Hispanic	Male
Officer Ford	Planestown	Patrol Officer	White	Male
Officer Gutierrez	Southview	Patrol Officer	Hispanic	Male
Officer Jackson	Planestown	Patrol Officer	White	Male
Officer Madison	College City	Patrol Officer	White	Male
Officer Peters	College City	Patrol Officer	White	Female
Officer Russell	College City	Patrol Officer	White	Male
Officer Adams	University Town	Patrol Officer	Black	Male
Officer Kasem	University Town	Patrol Officer	White	Male
Officer Wilson	University Town	Patrol Officer	White	Male
Officer Anderson	University Town	Patrol Officer	White	Male
Officer Kimmel	Planestown	Community Resource Officer	White	Female
Officer Tillis	College City	Professional Standards Officer	White	Male
Officer Leonard	Kentridge	Internal Affairs	White	Female
Sergeant Austin	Dry Pines	Patrol Sergeant	White	Male
Sergeant Boggs	Planestown	Patrol Sergeant	White	Male
Sergeant Clark	Southview	Patrol Sergeant	White	Male
Sergeant Davis	Southview	Patrol Sergeant	White	Male
Sergeant Evans	Dry Pines	Patrol Sergeant	White	Male
Sergeant Fallows	Planestown	Patrol Sergeant	White	Male
Sergeant Harrison	College City	Patrol Sergeant	White	Male
Sergeant Moore	University Town	Patrol Sergeant	White	Male
Sergeant Gibson	Planestown	Administrative Sergeant	White	Male
Lieutenant Dixon	University Town	Lieutenant	White	Male
Detective Gates	Kentridge	Detective	White	Male
Detective Hawthorn	Kentridge	Detective	White	Male
Commander Lenox	Kentridge	Patrol Commander	White	Male
Dep Chief Thomas	College City	Deputy Chief	White	Male
Chief Mullins	Dry Pines	Chief	White	Male
Chief Simms	Planestown	Chief	White	Male

a 'third eye' (Ariel et al. 2015) within work settings, but from the camera system's ability to 'do things in the world' (Pickering 1995:9). To illustrate these points, this section provides 3 examples of how body camera system's material agency accompanies routine variation at the individual and organisational levels. Given the methodological limitations of interviews and the study's small sample, these findings should not be considered representative of policing agencies' experiences with BWCs in general, but rather, illustrative of the types of dynamics involved when police organisations adopt advanced digital ICT.

The Performativity of Body Cameras and Patrol Work Routines

Citizen encounters represent a core aspect of patrol work and serve as the public face of policing. Improving citizen contacts is a central motivation for the adoption of wearable camera technology. Having patrol officers don cameras is intended to 'civilize' (Lippert and Newell 2016) the conduct of both officers and citizens, a hope born out in research demonstrating that the technology increases officers' 'presentation of self' (see Sandu and Haggerty 2017, Sandu 2016) or 'self-awareness' (see

Ariel et al. 2018, Braga et al. 2018). Patrol officers we interviewed spoke to this point, noting how the technology, in the words of Sergeant Evans from the Dry Pines Police Department, 'makes every cop more of a robot. Canned speech. Because now you have to mind your p's and q's.'.

But as much as officers discussed camera technology altering how they approached their interactions with the public, they also noted how BWCs facilitated what they did during these interactions. Interpersonal communication in policing is a highly skilled practice consisting of three tasks, 'setting the stage', 'gathering evidence', and 'confirming information' (McDermott and Hulse 2012:18). Completing these tasks requires not only speaking and listening, but also the effective management of 'eye contact, body position, voice tone, facial expressions, gestures, physical distance, and physical contact' as well as the ability to 'restate someone's thoughts in different words and in a nonjudgmental manner'. These demands can prove challenging, which opens a space for technological assistance. The following quotes are exemplary of how wearable cameras can help in this regard:

> 'There was three females in a car that were acting suspicious in a parking lot … And I went and talked to one of the passengers—and we call them indicators—and she was giving me all of these odd indicators in her responses and her body movements and the other people's in the car … And so to me that's comforting because I might not remember—I might remember five of the eight indicators and document those appropriately. But if they miss my memory and I don't recall them, they're gone from my typed report. But if the camera captures that, it helps solidify the case or if it's inculpatory or exculpatory information.' (Officer Anderson, University Town)

> 'We were dispatched to assist our officers to some guy that tried to cut somebody with a machete. He was hiding in the attic and then we didn't want to play gopher with the guy and stick your head there. So, like I said, these [cameras] tie into our iPhones, so you could review the videos or you could see it live. It's [the feed] just a couple seconds behind. We just stuck the—we taped this [camera] on a broomstick, shoved it up there, and saw it on the video down here nice and safe.' (Officer Estes, Planestown)

These quotes illustrate how the *performativity* (Barad 2003, Orlikowski and Scott 2008) of body camera technology – its ability 'to do things in the world' (Pickering 1995) – modifies how officers handle personal interactions during patrol work. In the first quote, the camera's ability to see and hear, and to record what it sees and hears, assists the officer facing a particularly demanding situation – investigating a vehicle with 3 passengers present. Unsure of his ability to recall all the indicators of suspicion that he notes at that particular time, he relies on the camera's digital memorialisation of the event to help him remember.[6] In this way, the police's ability to recollect events is not simply a function of officers' human aptitude to remember what they saw or heard, but a product of their relationship with mobile capture devices and the cloud-based video storage infrastructures for reviewing past events preserved in footage.

In the second quote, the unique characteristics of body cameras as small devices that can be easily deployed assists officers facing a difficult circumstance, an armed suspect hiding in a cramped space. In this instance, the mobility of the camera, a function of its size, detachability from its human host (the officer), adaptability to a temporary material host (the broomstick), and interconnectivity with a wider technological system (iPhones), enables the police to extend their visibility and audibility beyond human limits and engage the suspect communicatively. Eventually, as Officer Estes later explained to us, the police were able to convince the armed suspect to surrender when they informed him that they could see him. Given the concerns with police violence that have guided the adoption of wearable cameras, it is worth noting that the police were able to detain the suspect without an increased use of force. In this instance then, body cameras not only enhanced the power of the police to see crime, but also their ability to communicate effectively in order to resolve conflict with less force.

A central theme within the sociomateriality literature is re-orienting how we understand agency in a society where human action is regularly mediated through technology (Orlikowski 2009). These two examples illustrate how patrol officers 'displace' (Latour 1992) onto their material deputies (body cameras) elements of their agency – recalling details in stressful settings, obtaining close physical

proximity – central to patrol work. Adapting their interpersonal communication in this way, the officers were able to realise successful outcomes to these encounters.

This is not to say that the 'material agency' (Pickering 1995) of technology is equivalent to that of human officers. In some instances, body cameras are able to do things – fit into tiny spaces – that human officers would be unable to do. In other instances, cameras are unable to do things – some officers complained that the poor resolution of the digital video produced by their cameras obscured the indicia of alcohol consumption in HGN (Horizontal Gaze Nystagmus) field sobriety tests – that human officers are able to do. But the particular ability of camera technology to move, see, hear, and recall nonetheless becomes 'imbricated' (Leonardi 2011) in the modification of patrol routines.

The Interoperability of BWC Cloud Storage and Media Duplication Routines

If the materiality of body-worn cameras impact routines at the individual level of policing, the same is true at the organisational level. Body cameras as technological devices comprise one element, albeit a central one, of a wider technological platform enabling the memorialisation of police work. Central to that system as well are the storage solutions for housing the digital video that cameras produce. Videos can be stored either on in-house servers or cloud-based systems, often sold as an additional service by camera manufacturers. Previous research on police BWCs has noted that video file storage represents a major recurring cost that can have unexpected effects for departments. High storage costs, for instance, can cause departments to dictate shorter retention times for video files, which runs counter to the goal of strengthening police accountability (Fan 2018, Joh 2016). Thus, the costs associated with implementing a technology can represent a 'constraint' (Leonardi 2011) limiting an organisation's ability to realise the goals – the digital video recording of police actions in the case of BWCs – for which the technology was adopted in the first place. While the costs of video storage can act as a 'constraint' forcing organisations to adapt organisational routines for data management in suboptimal ways (limiting video retention), our interviews revealed how the material specificity of storage solutions can also provide unanticipated 'affordances' (Leonardi 2011) conducive to improvements in related routines.

The experiences of the Kentridge Police Department are instructive in this regard. Around the time of its BWC adoption, the department experienced a problematic backlog of media requests (ranging from private surveillance videos to 911 calls) from the district attorney's office, private attorneys, and public. The reasons for the backlog were sociomaterial in nature, but unrelated to body cameras. First was demand – the district attorney's office instituted a new evidence policy whereby all media for its five most common types of crime (drinking and driving, domestic violence, etc.) would automatically be provided by departments. 'Before', as Technician Rooks, the media duplication technician at the department recalled, 'they would just send us a specific request for each case and what media they wanted … and then they changed it to, 'we want everything from every traffic stop you've ever made to the highest felony and we want it upfront'. That just completely blew up the workload.'

Second was process – there was no rational procedure in place to handle media requests. 'The way it was set up before [I arrived],' explained Manager Knox, the Records Manager at Kentridge, 'Records gave the DAs her [Technician Rooks] phone number. But then she got inundated with' requests.

Third was material multiplicity – the media in question all resided on different systems and in different formats. 'On the old system,' Manager Knox shared with us, 'for the in-cars, we had one system. And then you had photos on another system. And then body-worn cameras were on a third system. And the interview room was on a yet a fourth system. And then, if the store had a video and the officer picked it up and booked it into evidence, then you had that fifth system. So then she'd [Technician Rooks] have to request evidence to pull the video or she'd have to go to these different places to go for it.' Related to this, the state attorney general's office had recently implemented an 'electronic discovery' platform to receive different types of

media from departments. But the platform did not handle different media types easily, and it had a 2-gigabyte size limit on files that made it hard to use. As a result, Technician Rooks eventually fell some 200 requests behind on her workload, and the department failed its accreditation review with the International Association for Property and Evidence because, as the Crime Scene and Evidence Manager at Kentridge told us, 'the girls who were here … didn't have time to do any of the property and evidence functions because of all the media stuff that was getting thrown on them'.

This sociomaterial problem required a sociomaterial solution. First, a new process for media requests was implemented. The media duplication unit was relocated from the Evidence Department to the Records Department, and all media requests needed to be made through a new form and reviewed by the Records Department before reaching Technician Rooks. Second, the cloud storage system the department subscribed to support their body cameras provided an unanticipated solution to the technical challenges posed by the material multiplicity of digital media and the prosecutor's office's ineffective platform. As Manager Knox described it:

> 'With [the cloud storage], of course the body-worn cameras were always there, but the officers can take their pictures from their phone and upload it straight to [to the cloud] under that same case number that the body-worn camera is. Same thing with the in-car videos, it goes to the same location … So really, now, instead of going to these four different programs and the department stores that have their videos, the officer can send a link and say, 'OK, give me your phone number'. And then while they're still talking, they can upload that video … So now, you log into [the cloud], you pull up that case number, and you can see the 20 different types of media, the 2 in-cars and the 4 body-worn cameras, and the 80 picture or 10 pictures or whatever. And all you have to say is, 'create a case', and then, 'share the case', type in the DA's email address, and hit 'send'. Versus logging into five different things.'

Two aspects of cloud storage materiality are important here. First is the *receptivity* of the cloud storage system to multiple types of digital files. The cloud service that Kentridge subscribed to is able to accept digital files from in-car cameras, mobile devices, and body cameras, among others. So then, rather than 'logging into five different things' in order to download files and then either re-upload them to the DA's platform or combine them to create a file, the department is able to create files seamlessly in the cloud.

Second is *accessibility*, or the ability of the cloud storage system to make the digital files it compiles available to different human users. This is accomplished through hyperlinks to the files located on the cloud, but also through a robust digital environment able to process and store files too large for other platforms to handle. Thus, rather than having to burn a compact disc with digital files on them or waiting on the unresponsive platform offered through the state's attorney's office, Kentridge is able to efficiently send files to the different actors requiring access to it.

The receptivity and accessibility of cloud storage provides the technology an *interoperability*, or ability to function with different types of digital media and across different types of human users and offices. This interoperability allowed Kentridge to address the challenges of material multiplicity that had confounded it earlier and to process media requests more quickly. It also proved a vital material accompaniment to the process changes the department had implemented to systematise media requests more rationally. As a result, the department was able to clear its backlog of media requests and secure accreditation for its evidence management operations. In this way, the material agency of body worn camera systems impact critical policing routines beyond those related to officer-citizen encounters.

The Objectivity of Digital Files and Citizen Complaint Routines

Wearable cameras are believed to hold value for the police and the communities they serve by improving the quality of interactions between them. To determine whether this is the case, existing literature has used complaints as a measure of police conduct. Declines in complaints are interpreted as indications of improved or 'civilized' police conduct with citizens and increased police

accountability (Ariel et al. 2016a). However, our interview data demonstrate why caution is needed before taking registered civilian complaints against the police as a direct measure of officer behaviour. That is, complaints reflect the organisational routines through which they are generated. And the materiality of technology can play a decisive role in shaping such routines.

Across the departments participating in our study, it was common to hear that BWCs were perceived to have brought about a reduction in citizen complaints. Sergeant Tillis at College City, who was in charge of professional standards, noted, 'one thing that I've noticed in my job is reduction in complaints. We do get fewer complaints over the last two years'. Interestingly, however, the officers we spoke with did not attribute these reductions to behavioural changes on their part. Instead, they explained it through one of two factors. First was publicity about the use of police body cameras, which served as a deterrent to people seeking to file false complaints. As Officer Ford from Planestown also told us, 'I think the word is getting out too to the public that they know we're wearing these now so they know that they can't just say anything they want or if they do say whatever they want they can't complain about it later when they know they're being recorded.'

Second was the ready availability of video footage of police-citizen contacts, which supervisors could use to quickly settle complaints. Stories such as the following were normal among the departments we spoke with.

> 'Typically, with the original complaints, without body worn cameras, you would have to bring the officer in, you would have to do an interview: 'Can you tell me what happened during this?' You would take the complaint first, and then you would interview the officer, and, 'you tell me what took place'. And so you would get two different sides. Now when I get a complaint, the first thing I do is I look immediately at the body worn camera and then I'll call them back and say I viewed the camera and what I'm hearing is not the same thing that you told me over the phone. If you'd like to, you can come down and view the video for yourself. I'd be more than happy to show it to you. And they always decline.' (Sergeant Boggs, Planestown)

The broader literature on police BWCs has noted that cameras hold the potential to help departments handle complaints more efficiently (Koen, Willis, and Mastrofski 2019, Bakardjiev 2015, White 2014). This quote helps demonstrate how BWCs do this.

Central is what can be referred to as the *objectivity* of the digital records body camera technology produces. Objectivity here has two meanings. The first concerns the capacity of digital technologies such as body-worn cameras to visually and audibly capture events and digitise them into 'data packets' which can be 'transported quite literally at the speed of light and at near zero cost across large distances' (Tiwana 2013:13). In other words, digital technologies transform lived experience into objects that circulate effortlessly through society. Prior to the advent of body cameras, police personnel tasked with investigating police conduct 'would take the complaint first' and then 'interview the officer', a time-consuming exercise that would invariably produce 'two different sides'. With body cameras, the need to conduct such interviews is largely eliminated, as the narrative of what occurred is present on video. With this digital object in hand, supervisors make an informal adjustment to the complaint process, asking complainants to view the video with them before pursuing their claims further. Sergeants from different departments we spoke with reported that complainants generally declined to come in when offered the opportunity. Thus, the objectivity of digital data enables the police to alter complaint processing routines in a way that reduces the number of complaints received.

The reticence of complainants to view footage with police personnel ties to the second meaning of body camera *objectivity*. This is the perception among the police and public alike that the technology provides a neutral, third-party perspective of events that constitutes truth. When told by a police sergeant that 'I viewed the camera and what I'm hearing is not the same thing that you told me over the phone,' people are reluctant to move forward with their claims. For the police, this substantiated their suspicions that, as Officer Peters from College City reported, 'The public lies all the time about what we do.'

The modification in complaint processing routines described here has been described in prior research (Koen, Willis, and Mastrofski 2019, Harris 2010). In an early article on the potential impact

of BWCs on policing, law professor David Harris (2010) explains how police supervisors meet with potential complainants to review body camera footage and how these meetings help reduce complaints. 'In a number of cases', Harris (2010) writes, 'the complainants have reconsidered their complaint [*sic*] after this review'. Harris perceives this as 'unequivocally, a good thing; if citizens can see that they were, perhaps, mistaken, or that they did not understand the situation from the officer's point of view, or that they did not have all the facts, they may come away with a better grasp of the situation, and feeling that they need not continue with the complaint process' (42).

But as science and technology studies have established, objectivity is socially constructed (Daston 1992). To say that body cameras possess objectivity is not the same as to say that they present the truth. Seeing is 'socially situated', and 'professional vision' can structure how video evidence is interpreted by lay viewers (Goodwin 1994, see also Brucato 2015). The tensions and distrust that define police-civilian relations in many communities in the US, and provide part of the motivation for adopting BWC technology in the first place, can be expected to shape how people view video evidence. It's possible that after receiving a call from the police, an individual citizen realises she was wrong and declines to file a complaint. But she might also be apprehensive of visiting a department and meeting someone (most likely a white, male, uniformed officer) who has already voiced scepticism about her version of events ('what I'm hearing is not the same thing that you told me'). This would speak less to the truth of the interactions on the street captured by body cameras than to the power dynamics embedded in organisational routines constituted through the materiality of camera technology.

Discussion

This article has sought to explore an understudied aspect of police technology; the potential impact of body worn cameras on police organisation. Using a sociomaterial theoretical lens emphasising the entanglement of agential capabilities of material artifacts and social organisations and semi-structured interviews with 42 employees from 6 police agencies in the Rocky Mountains/High Plains region of the US, it illustrates how wearable camera technology is seen to 'afford' (Leonardi 2011) officers and agencies the ability to modify their work routines (Feldman and Pentland 2003, Feldman 2000). Further, these modifications occur in conjunction with particular dimensions of body camera system's material agency (Robey, Anderson, and Raymond 2013, Pickering 1995). Through the *performativity* of video recording devices to move, see, hear, and record, officers note altering how they approach patrol work by displacing certain tasks onto their material associates, which allow them to better carry out their patrol work responsibilities. Through the *interoperability* of the cloud storage systems, departments see themselves better able to reorganise critical information processing routines in support of criminal prosecutions. Through the *objectivity* of the digital files produced by body-worn camera systems, departments effortlessly create packets of events bearing the impression of truth and legitimacy with which they are able to more easily resolve complaints from citizens.

This study is not without limitations. The most serious is the small sample size, split across multiple policing agencies, which prevents us from being able to generalise our findings. Beyond sample size, it's also possible that the findings are influenced by selection bias. Officers and departments who are more positive about body-camera technology might be those agreeing to take part in the research. In addition, as noted above, interview data are susceptible to different biases. One is social desirability bias. Police body cameras and the issues of public accountability and use of force that surround them are sensitive topics, and the employees we spoke with might have over-reported positive behaviour on their part, while under-reporting negative conduct. Another is recall bias. Respondents might report scenarios where camera technology made a difference in their work even though their work routines remain largely unchanged.

The concerns over selection bias could best be addressed in future research by drawing data from a randomised sample of interviewees, while those over social desirability and recall bias require triangulating methods (through content analysis of police records and/or videos, for instance) in order

to contextualise the interview data. With regards to generalizability, we offer that these findings are not intended to be representative of the general impact of BWCs for the police. Rather, they are meant to explore a less considered dimension of a potentially powerful technological innovation within a core criminal justice institution. And in this regard, they speak to past findings while highlighting future lines of investigation

Most importantly, the findings represent a key contribution to the understudied topic of body camera technology's impact on police organisation (see Lum et al. 2019, Lum et al. 2015) and support the idea that body-worn cameras as a technology modify how organisations work. In a recent study, Koen, Willis, and Mastrofski (2019) find that body cameras enhance people processing (reporting, discretion, and civilian complaints) and environment changing routines (police-citizen interactions) within police organisations, but not people-changing routines (training and supervision). The difference can be explained by the technical specificity associated with particular routines – those with tangible goals and clearly articulated means for accomplishing them are more amenable to technological enhancement.

This article offers a distinct interpretation of technologically-mediated change in police organisation routines that emphasises materiality. The unique performative capabilities of body cameras and the technological infrastructure supporting them allow police officers and agencies to re-do what they do. 'Displacement' (Latour 1992) here is key. The police are able to task to this technology actions that in the past would have been completed by human hands (and eyes): registering body movements during interviews with suspects, duplicating evidence in support of criminal prosecutions, and generating narratives of police conduct in complaint investigations. And this rearrangement of the physical work of policing results in alterations in the routines of policing.

This is not to argue that the technical specification of policing routines does not also mediate the impact of body camera technology, as Koen, Willis, and Mastrofski (2019) contend. Given the exploratory nature of our research, our study is silent on that point. However, the findings add the important consideration that the specification of technology can also constitute policing routines. Put simply, technology varies. Some body cameras and body camera systems will perform better or differently than others in terms of picture resolution, recording in poor light conditions, integrating multiple types of media files, supplying metadata in order to create more-detailed files, and so on. And these variations will bear upon how the technology influences (or not) organisational operations.

This is why a sociomaterial perspective that takes materiality seriously is central to social scientific research on technology. There exists a tendency within technological research, even in fields dedicated to studying technological systems, to overlook materiality (see Robey, Anderson, and Raymond 2013). This tendency is discernible in policing research on body cameras which takes the technology as a single variable rather than breaking it down into its constituent parts (recording device, storage system, data files, etc.) and considering the variability within each. Future research on the organisational implications of body-worn cameras would do well to consider then both how more socially-determined factors like the specification of organisational routines and more technologically-determined factors such as the material specification of camera systems matter in police agencies' experiences with the technology.

Along the same lines, in focusing greater attention on the materiality of technology, future policing research should examine both 'affordances' and 'constraints' (Leonardi 2011). This article has largely centred on the 'affordances' of body worn cameras, their 'material properties' that 'afford different possibilities for action based on the contexts in which they are used' (Leonardi 2011:153). Research such as that by Koen, Willis, and Mastrofski (2019) highlighting the inability of BWCs to impact organisational processes as expected, or that by Fan (2018) and Joh (2016) highlighting how storage costs serve to limit retention periods, underscore that this technology also presents 'constraints' to organisations' ' … ability to carry out their goals' (Leonardi 2011:153). Thus, change in routines stems not only from the materiality of technology, but also from the relationship of that materiality to organisational goals and expectations and the means specified for realising them.

Future research should consider how characteristics such as goals, means, and governance structure relate to the 'affordances' and 'constraints' that organisations encounter with wearable cameras.

The preceding point speaks to policy concerns. Researchers have argued that building police accountability through BWC technology requires policy change, such as a mandatory activation policy to record all police interactions with the public, a retention policy to preserve data longer, or an access policy to provide public access to BWC footage (Fan 2018, Joh 2016, Ariel et al. 2016a, Mateescu et al. 2015, Newell 2014). Nothing in our findings disputes the reasonableness of these positions. However, the materiality of technology is deeply interwoven with these positions in subtle ways that deserve consideration. That is, the potential of policy to dictate officer and agency behaviour hangs together with the technology itself. Studies have found that officers are often reluctant to follow mandatory activation protocols (see Hedberg et al. 2016, Ariel et al. 2016b) and the high costs of storing digital video recordings can make extending retention periods difficult (Fan 2018, Joh 2016). However, automatic triggers similar to the ones used to activate dashboard-mounted cameras in police cruisers could be developed for wearable cameras, thereby eliminating the problems associated with officer activation (Mateescu et al. 2015). Advances in the price and performance of digital storage technology, meanwhile, can be expected to reduce the costs of retaining data. We as researchers should remain sensitive to the ways in which the materiality of technology could be leveraged to support policies and organisational goals valued by the police and the communities they serve.

These considerations could be extended to law enforcement research more generally. Technology occupies an increasingly central place in law enforcement, and technological topics have received increasing attention in socio-legal studies of late. These include the embrace of DNA identification within the criminal justice system which has revolutionised forensic science (Lynch et al. 2010), the adoption of Big Data by municipal police departments which signals a shift to predictive policing (Brayne 2017), the proliferation of digital criminal records on the internet which restricts the life opportunities of individuals who have successfully completed their contact with the criminal justice system (Lageson 2017), among others. Sociomateriality provides an important perspective for investigating these phenomena. The materiality of forensic methods, predictive crime modelling, and digital criminal records have structuring effects in how organisations operate and how people experience the law.

This induces us as researchers to open these 'black-boxes' (Latour 1999) to interrogate their design and modes of discrimination (see, for example, Maurutto and Moffit's (2017) analysis of predictive analytics). Or to consider how norms, values, beliefs, and patterns of practice are brought to bear on the development and use of technology (see, for example, Cole's (2017) history of the development of forensic technologies). Or to be responsive to how innovative technologies in policing can reshape law enforcement routines that can impact the outcomes of the law. By being more mindful to the material capabilities of technology, we can forge a deeper understanding of the role of technology in constituting the law, with the hope of steering that constitution toward more just ends.

Notes

1. The record is not wholly positive. A well-publicised random trial conducted with the Washington D.C. municipal police department (Yokum, Ravishankar, and Coppock 2017) as well as other recent research (Koslicki, Makin, and Willits 2019) have found small, insignificant effects of BWC on use of force, civilian complaints, policing activities, and judicial outcomes. Similarly, Ariel et al. (2018, 2016c) note BWCs can increase assaults against officers by deterring use of force when it is needed.
2. Prescriptions for police conduct have their limits. Hedberg et al. (2016) in a controlled trial study in Maryvale, AZ found that officers only activated their cameras in about 32% of incidents. This is not unusual; Ariel and colleagues use such non-compliance to define control groups in their research (Ariel et al. 2016b).
3. Management scholars are not the first to consider the constitutive relationship of technology and society, and they readily note their intellectual debt to process-based theorists in science and technology studies, such as

Barad (2007), Pickering (1995), and Latour. But they have worked to refine the distinctions between process-based approaches in order to maximise their application to organisational settings.

4. The names of all police agencies and personnel participating in this study are pseudonyms in order to protect the identities of participants.
5. It is important to note the limitations of interviews as a method for documenting organisational change related to technology adoption. Participants, especially when prompted to consider "how have BWCS changed the way you think about your work", may recall where camera technology made a difference in a particular instance even though long-term changes in individual or organisational practice have not occurred. The findings stemming from this research should thus not be read as definitive proof of technologically-mediated organisational change, but as indicative of the possible impacts that body-camera technology could have.
6. It is worth noting that departmental policy in part dictates whether officers review camera footage when generating reports. But there is disagreement about best practices (Mateescu et al. 2015). Research has shown that reviewing BWC recordings improves police report accuracy (Dawes et al. 2015). But there are concerns that easy access to footage could lead to privacy violations for citizens recorded in sensitive or embarrassing situations and that officers might construct narratives based on video content rather than their own memories (Brucato 2015).

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the National Science Foundation [grant number 1734632].

References

Akrich, M., 1992. The de-scription of technical objects. *In*: W. Bijker and J. Law, eds. *Shaping technology/building society: studies in sociotechnical change*. Cambridge, MA: MIT Press, 205–224.

Alpert, G., and McLean, K., 2018. Where is the goal line? A critical look at police body-worn camera programs. *Criminology & public policy*, 17 (3), 679–688.

Ariel, B., et al., 2016a. 'Contagious accountability': a global multisite randomized controlled trial on the effect of police body-worn cameras on citizens' complaints against the police. *Criminal justice and behavior*, 44 (2), 293–316.

Ariel, B., et al., 2016b. Report: increases in police use of force in the presence of body-worn cameras are driven by officer discretion: a protocol-based subgroup analysis of ten randomized experiments. *Journal of experimental criminology*, 12 (3), 453–463.

Ariel, B., et al., 2016c. Wearing body cameras increases assaults against officers and does not reduce police use of force: results from a global multi-site experiment. *European journal of criminology*, 13 (6), 774–755.

Ariel, B., et al., 2018. Paradoxical effects of self-awareness of being observed: testing the effect of police body-worn cameras on assaults and aggression against officers. *Journal of experimental criminology*, 14, 19–47.

Ariel, B., Farrar, W., and Sutherland, A., 2015. The effect of police body-worn cameras on use of force and citizens' complaints against the police: a randomized controlled trial. *Journal of quantitative criminology*, 31 (3), 509–535.

Bain, A., 2016. Horses and horsepower, fingerprints and forensics: the development of technology and law enforcement. In: Andy Bain, ed. *Law enforcement and technology*. London: Palgrave Macmillan, 9–25.

Bakardjiev, D.K., 2015. Officer body-worn cameras—capturing objective evidence with quality technology and focused policies. *Jurimetrics*, 56, 79–112.

Barad, K., 2003. Posthumanist performativity: toward an understanding of how matter comes to matter. *Signs: Journal of women in culture and society*, 28 (3), 801–831.

Barad, K., 2007. *Meeting the Universe Halfway: Quantum physics and the entanglement of matter and meaning*. Durham, NC: Duke University Press.

Braga, A., et al., 2018. The effects of body-worn cameras on police activity and police-citizen encounters: a randomized controlled trial. *Journal of criminal law and criminology*, 108 (3), 511–538.

Brayne, S., 2017. Big data surveillance: The case of policing. *American sociological review*, 82 (5), 977–1008.

Brucato, B., 2015. Policing made visible: mobile technologies and the importance of point of view. *Surveillance & society*, 13 (3/4), 455–473.

Byrne, J., and Marx, G.T., 2011. Technological innovations in crime prevention and policing. a review of research on implementation and impact. *Cahiers Poliestudies*, 20 (3), 17–40.

Cole, S., 2017. Establishing culpability: forensic technologies and justice. In: Mike McGuire, and Thomas Holt, ed. *The Routledge handbook of technology*. New York: Routledge Press, 505–517.

Daston, L., 1992. Objectivity and the escape from perspective. *Social studies of science*, 22 (4), 597–618.
Dawes, D., et al., 2015. Body-worn cameras improve law enforcement officer report writing accuracy. *Journal of law enforcement*, 4 (6), 1–21.
Fan, M.D., 2018. Body cameras, big data, and police accountability. *Law & social inquiry*, 43 (4), 1236–1256.
Feldman, M., 2000. Organizational routines as a source of continuous change. *Organization science*, 11 (6), 611–629.
Feldman, M., et al., 2016. Beyond routines as things: introduction to the special issue on routine dynamics. *Organization science*, 27 (3), 505–513.
Feldman, M., and Pentland, B., 2003. Reconceptualizing organizational routines as a source of flexibility and change. *Administrative science quarterly*, 48 (1), 94–118.
Gaub, J., et al., 2016. Officer perceptions of body-worn cameras before and after deployment: a study of three departments. *Police Quarterly*, 19 (3), 275–302.
Goodwin, C., 1994. Professional vision. *American anthropologist*, 96 (3), 606–633.
Grossmith, L., et al., 2015. *Police, camera, evidence: London's cluster randomized controlled trial of body worn video*. London: College of Policing.
Harris, D., 2010. Picture this: body worn video devices ('head cams') as tools for ensuring fourth amendment compliance by police. *Texas tech law review*, 43, 357–371.
Harvard Law Review, 2015. Considering police body cameras: developments in the law. *Harvard law review*, 128, 1794–1834.
Hedberg, E.C., Katz, C., and Choate, D., 2016. Body-worn cameras and citizen interactions with police officers: estimating plausible effects given varying compliance levels. *Justice quarterly*, 34 (4), 627–651.
Henstock, D., and Ariel, B., 2017. Testing the effects of police body-worn cameras on use of force during arrests: a randomized controlled trial in a large British police force. *European journal of criminology*, 14 (6), 720–750.
Jarzabkowski, P., and Pinch, T., 2013. Sociomateriality is 'the New Black': accomplishing repurposing, reinscripting and repairing in context. *Management*, 16 (5), 579–592.
Jennings, W.G., *et al.*, 2017. A quasi-experimental evaluation of the effects of police body-worn cameras (BWCs) on response-to-resistance in a large metropolitan police department. *Deviant behavior*, 38, 1332–1339.
Jennings, W., Fridell, L., and Lynch, M., 2014. Cops and cameras: officer perceptions of the use of body-worn cameras in law enforcement. *Journal of criminal justice*, 42, 549–556.
Jennings, W., Lynch, M., and Fridell, L., 2015. Evaluating the impact of police officer body-worn cameras (BWCs) on response-to-resistance and serious external complaints: evidence from the Orlando police department (OPD) experience utilizing a randomized controlled experiment. *Journal of criminal justice*, 43 (6), 480–486.
Joh, E., 2016. Beyond surveillance: data control and body cameras. *Surveillance & society*, 14 (1), 133–137.
Katz, C., et al., 2014. *Evaluating the impact of officer worn body cameras in the phoenix police department*. Phoenix, AZ: Center for Violence Prevention & Community Safety, Arizona State University. Available: https://publicservice.asu.edu/sites/default/files/ppd_spi_feb_20_2015_final.pdf.
Kelling, G., and Moore, M., 1988. The evolving strategy of policing. *Perspectives on policing*, 4, 1–15.
Koen, M., Willis, J., and Mastrofski, S., 2019. The effects of body-worn cameras on police organisation and practice: a theory-based analysis. *Policing and society*, 29 (8), 968–984.
Koslicki, W.M., Makin, D.A., and Willits, D., 2019. When no one is watching: evaluating the impact of body-worn cameras on use of force incidents. *Policing and society*, 1–14. DOI:10.1080/10439463.2019.1576672.
Lageson, S., 2017. Crime data, the internet, and free speech: an evolving legal consciousness. *Law & society review*, 51 (1), 8–41.
Latour, B., 1992. Where are the missing masses? The sociology of a few mundane artifacts. In: W. Bijker, and J. Law, ed. *Shaping technology/building society: studies in sociotechnical change*. Cambridge, MA: MIT Press, 225–258.
Latour, B., 1999. *Pandora's hope: essays on the reality of science studies*. Cambridge, MA: Harvard University Press.
Leonardi, P., 2011. When flexible routines meet flexible technologies: affordance, constraint, and the imbrication of human and material agencies. *MIS quarterly*, 35 (1), 147–167.
Leonardi, P., and Barley, S., 2010. What's under construction here? Social action, materiality, and power in constructivist studies of technology and organizing. *Academy of management annals*, 4 (1), 1–51.
Lippert, R., and Newell, B.C., 2016. Introduction: the privacy and surveillance implications of policy body cameras. *Surveillance & society*, 14 (1), 113–116.
Lum, C., et al. 2015. *Existing and ongoing body worn camera research: knowledge gaps and opportunities*. Report for the Laura and John Arnold Foundation. Fairfax, VA: Center for Evidence-Based Crime Policy, George Mason University.
Lum, C., et al., 2019. Research on body-worn cameras: what we know, what we need to know. *Criminology & public policy*, 18 (1), 93–118.
Lynch, M., et al., 2010. *Truth machine: the contentious history of DNA fingerprinting*. Chicago: University of Chicago Press.
Mateescu, A., Rosenblat, A., and boyd, d. 2015. *Police body-worn cameras: Working Paper*. Data & Society Research Institute.
Maurutto, P., and Hannah-Moffat, K. 2017. Big Data analytics and algorithmic risk. Paper presented at the 2017 Annual Meeting of the Law & Society Association, Mexico City.

Mazmanian, M., Orlikowski, W., and Yates, J., 2013. The autonomy paradox: the implications of mobile email devices for knowledge professionals. *Organization science*, 24 (5), 1337–1357.
McDermott, P., and Hulse, D., 2012. Interpersonal skills training in police academy curriculum. *FBI law enforcement bulletin*, 81, 16–20.
Morrow, W., Katz, C., and Choate, D., 2016. Assessing the impact of police body-worn cameras on arresting, prosecuting, and convicting suspects of intimate partner violence. *Police quarterly*, 19 (3), 303–325.
Newell, B.C., 2014. Crossing lenses: policing's new visibility and the role of 'smartphone journalism' as a form of freedom-preserving reciprocal surveillance. *Journal of law, technology & policy*, 1, 59–104.
Orlikowski, W., 2009. The sociomateriality of organizational life: considering technology in management research. *Cambridge journal of economics*, 43, 125–141.
Orlikowski, W., and Scott, S., 2008. Sociomateriality: challenging the separation of technology, work and organisation. *Academy of management annals*, 2 (1), 433–474.
Owens, C., Mann, D., and Mckenna, R. 2014. The Essex body worn video trial: the impact of body worn video on criminal justice outcomes of domestic abuse incidents. College of Policing.
Pentland, B., and Feldman, F., 2005. Organizational routines as a unit of analysis. *Industrial and corporate change*, 14 (5), 793–815.
Pickering, A., 1995. *The mangle of practice: time, agency, and science*. Chicago, IL: University of Chicago Press.
Ready, J.T., and Young, J., 2015. The impact of on-officer video cameras on police–citizen contacts: findings from a controlled experiment in Mesa, AZ. *Journal of experimental criminology*, 11 (3), 445–458.
Robey, D., Anderson, C., and Raymond, B., 2013. Information technology, materiality, and organisational change: a professional odyssey. *Journal of the association for information systems*, 14 (7), 379–398.
Sandu, A., 2016. Camera-friendly policing: how the police respond to cameras and photographers. *Surveillance & society*, 14 (1), 78–89.
Sandu, A., and Haggerty, K., 2017. Policing on camera. *Theoretical criminology*, 21 (1), 78–95.
Scott, S., and Orlikowski, W., 2014. Entanglement in practice: performing anonymity through social media. *MIS quarterly*, 38 (3), 873–893.
Stanley, J. 2017. A look at the high-tech gadgets being marketed to police. www.aclu.org, October 27. https://www.aclu.org/blog/privacy-technology/surveillance-technologies/look-high-tech-gadgets-being-marketed-police.
Sutherland, A., et al., 2017. Post-experimental follow-ups—fadeout versus persistence effects: the Rialto police body-worn camera effects four years on. *Journal of criminal justice*, 53, 110–116.
Tankebe, J., and Ariel, B. 2016. Cynicism towards change: the case of body-worn cameras among police officers. *Hebrew University of Jerusalem Legal Research Paper No. 16-42*. https://ssrn.com/abstract=2850743. Accessed September 15, 2017.
Tiwana, A., 2013. *Platform ecosystems: aligning architecture, governance, and strategy*. Waltham, MA: Morgan Kaufman.
White, M., 2014. *Police officer body-worn cameras: Assessing the evidence*. Washington, DC: Office of Community Oriented Policing Services/Office of Justice Programs.
White, M., Todak, N., and Gaub, J., 2017. Assessing citizen perceptions of body-worn cameras after encounters with police. *Policing: an international journal of police strategies and management*, 40 (4), 689–703.
White, M., Todak, N., and Gaub, J., 2018. Examining body-worn camera integration and acceptance among police officers, citizens, and external stakeholders. *Criminology & public policy*, 17 (3), 649–677.
Yokum, D., Ravishankar, A., and Coppock, A. 2017. Evaluating the effects of police body-worn cameras: a randomized controlled trial. Working Paper. The Lab.
Young, J., and Ready, J., 2016. A longitudinal analysis of the relationship between administrative policy, technological preferences, and body-worn camera activation among police officers. *Policing: A journal of policy & practice*, 12 (1), 27–42.