"Keeping the Queen's Peace": A Sociomaterial Study of Police and Guns in a "Mangle of Risk"

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ABSTRACT

This sociomaterial study analyzes the ways that material agency plays a key role in the organizing dynamics of risky work through a study of the carrying and use of handguns by U.S. and U.K. police officers. Qualitative data (interviews and focus groups) were collected over a three-year period with police ($N = 61$) in New York, where officers routinely carry guns, and in London, where they typically do not. Police unanimously describe the agentic role non-human artefacts like guns play in: a) framing their cognitive processes, b) influencing their behaviour and decision-making processes, and c) impacting individuals around them. Expanding Pickering's theorization of a *mangle of practice,* we inductively develop a *mangle of risk* to explain how human and non-human agency become entangled in risky work contexts, where danger is real and time pressure is high. Understanding these dynamics requires analysis of both frontline police narratives and the prescribed organizational policies, procedures, and routines intended to contain risky situations. Findings reveal that the tools provided to police to do their job both frame and constrain operational capabilities, potentially escalating danger for police, suspects, and the community in a *mangle of risk*.

1. Introduction

What police officers do, or do not do, with guns and other tools of force features prominently in the contemporary news. The policing tools provided, or not provided, by policymakers can unintentionally escalate risks to the community and police officers themselves, impacting the public's trust. Consider the actions of veteran Minneapolis Police Officer Kimberly Potter, who shot an unarmed man, Daunte Wright, in the chest during a routine traffic stop in 2021. When the 20-year-old victim attempted to evade custody, Officer Potter yelled, "Taser! Taser! Taser!", and then mistakenly drew her black steel handgun from her right holster instead of the yellow plastic Taser from her left (Bogel-Burroughs, 2021).

1.1. Sociomaterial challenges in risky work

There have been at least fifteen documented cases of weapons confusion over the last twenty years in the United States alone, resulting in police shootings unfolding in strikingly similar ways (Feuer and Zaveri, 2021). As one officer involved described it, his

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"brain was saying Taser," but his "body moved faster" than his mind, and his hand automatically drew his pistol instead. Weapons confusion illustrates one of the sociomaterial challenges in risky professions like policing where people are under stress in situations of uncertainty, danger is real, and time pressure is high. In these circumstances, public policies that dictate the interaction of police officers and weapons, such as requiring the carrying of handguns, can escalate risk. According to an ongoing analysis by the Washington Post (2024), U.S. police shoot and kill more than 1,000 people every year on average. Many of these shootings were considered lawful, but data suggest a troubling pattern in which unarmed civilians stopped for routine reasons were mistakenly shot (Levin, 2023). Social activist groups such as #BlackLivesMatter and #DefundPolice have made such shootings high-profile issues on the political agenda (Chokshi, 2016). Perhaps there is something more to discover about the ways police, guns, and policies interrelate in real-time, impacting risk.

As Cooren et al. (2012) observe, the human becomes a different agent when armed with a gun, thereby enabled and constrained in different ways. And armed humans are perceived differently in different contexts. For some people, armed police are a trusted source of protection and a sign of public safety. For others, armed police represent a potential threat to individual safety and personal security. At the same time, guns also have a form of material agency. In other words, guns have the capacity to act and influence actions, and through their performativity, do things independent of humans' direct control (Leonardi, 2011). For example, in 2014 U.S. gun manufacturer SIG Sauer introduced the P320 pistol, specifically designed as a striker-fired handgun to allow rapid firing. Police forces nationwide quickly adopted the P320 because it fired faster than other pistols. Yet, the popular striker-feature also made the handgun more vulnerable to accidental discharge. More than a hundred people reported that their P320 fired by itself during routine human movements such as holstering the weapon, walking downstairs, or climbing out of vehicles, seriously injuring 80 people, including 33 police officers (Barton and Jackman, 2023).

Despite the potential danger of tools adopted in high-risk settings such as policing, we still know relatively little about how human and non-human agency become enmeshed through sociomaterial dynamics at work. Research to date tends to either apply sociomateriality to routine work settings, such as the use of mobile smartphones in railroad engineering (Symon and Pritchard, 2015), or explores high-risk settings through alternative concepts such as sensemaking (e.g., Weick's (1993) analysis of the Mann Gulch fire and Cornelissen et al.'s (2014) analysis of the Stockwell shooting). Hallgren et al.'s (2018) literature review of extreme contexts research demonstrates that only one of the 136 studies they identified explicitly adopted a sociomaterial approach. This dearth in sociomaterial research, combined with the dangerous repercussions of performance breakdown in extreme contexts, makes sociomateriality and risky work an area warranting further study.

1.2. Dance of agency

In order to theorize about the complex interrelations between material and human agency in risky work settings we adopt Pickering's (1993, 1995) *mangle of practice*. According to Pickering (1993), people and things bring the other into being performatively, in a "dance of agency." Adopting and adapting Pickering's mangle allows us to focus on three key dynamics: 1) action, 2) intent, and 3) context. We ask: How do human and non-human agency interact in high-risk work settings? By addressing this question, we aim to make a *problem-driven* theoretical contribution (Corley and Gioia, 2011). The problem is how the agency of guns, and other tools of police work, influence police officers' practice on the frontline. Differences in the availability, use, and/or non-use of guns distinguish the United States and United Kingdom with significant implications for organizing. Although the materiality of the gun itself does not change, the gun's material agency can change significantly, enmeshed as it is with context-specific phenomena. For instance, in the United Kingdom, where few police officers are armed, the public views the presence of a gun very differently than in America, where guns are more common.

For this study, we draw on qualitative data from 61 police officers from the United States, where police officers routinely carry guns, and the United Kingdom, where they do not. Given the challenging nature of fieldwork concerning sociomaterial practices (Orlikowski and Scott, 2015), our data collection aimed to elicit narrative accounts from police officers about their experiences of high-risk events—typically a violent confrontation with a member of the public—in their frontline police work. Following Symon and Pritchard (2015), we then analyzed narrative fragments from participants' accounts of high-risk events, and in particular, how they described the influence of weapons in their practice. Our study demonstrates how the tools provided to police officers to do their job both frame and constrain operational capabilities, materializing certain practices and impacting alternative policing options (e.g., de-escalation). By analyzing real-world examples of how human and non-human agency become entangled in day-to-day policing, we inductively theorize a *mangle of risk*. This concept represents a recursive process in which historic and cultural context interact to shape how allocated tools and human agency become entangled in the specific circumstances of risky police work through an on-going dialectic of resistance and accommodation (Pickering, 1993, 1995).

1.3. Contributions

These findings form the basis for three key contributions. First, by adopting a sociomaterial lens, we illuminate how the material agency of non-human artefacts influences human actions in risky work, potentially exposing frontline operators and the community to danger, harm, and injury. Our analysis in the specific circumstances of a risky work setting adds unique insights to sociomaterial theory, which has largely ignored this life-critical domain, by focusing on actions, intent, and context. Second, our findings demonstrate how the tools provided to humans by policymakers eager to control risk can paradoxically lead to risk escalation instead (Beck, 1992; Power, 2007). Third, by theorizing a mangle of risk, we answer calls for studies that problematize the significant role that corporeality and materiality play in organizing risk, revealing how situations "become" risky through police practice (Hardy et al.,

2020; Hardy and Maguire, 2016; Maguire and Hardy, 2013).

The paper is structured as follows: We begin by situating our study within both sociomateriality and risk management literature exploring sociomaterial theories and risk construction, and highlighting key elements of Pickering's mangle of practice. Next, we compare the U.S. and U.K. policing environments and describe the study's two-phase research design, including the data collection process and analytic approach. Then, we provide a detailed review of the study's findings and discuss the implications, defining the mangle of risk, and theorizing how human and non-human agency become enmeshed in risky work settings. Finally, we conclude with a summary, and identify key opportunities for future research.

2. Theoretical background

Social science researchers in the 1980s and '90s, such as Andrew Pickering, theorized about the interrelatedness of humans and technology in organizations. Although the term sociomateriality was not yet popular, several studies fruitfully examined how machine design potentially impacted people's performance, intelligence, and decision-making (Billings, 1991; Huber, 1990; Perrow, 1984; Sarter and Woods, 1994). During this period, Pickering (1993, 1995) developed his mangle of practice theories. In the 2000s, sociomateriality literature emerged in the field of IS to challenge assumptions about the neutrality of the human-technology interface, largely based on the work of Suchman (2000), and later, Orlikowski (2007). Sociomaterial researchers agreed that advanced technologies were not simply tools humans use and control, but rather technologies that had agentic properties of their own. An umbrella term of theoretical inclusivity, Scott and Orlikowski (2013, p. 79) describe sociomateriality as "one of a palette of approaches that researchers might consider working with to study the world." And as Leonardi (2013, p. 60) observes, "Today one of the most popular, most cited, most debated, and most critiqued topics in the fields of information systems and management is the topic of sociomateriality."

However, there were distinct criticisms of sociomaterial research. Mutch (2013, p. 32 & 34) notes "the application of sociomateriality appears to be difficult in practice" because theorists are stuck in philosophical debates, offering "few indications as to how to carry out concrete social analysis." Consequently, the author explains that researchers often fail to be specific about technology and neglect analysis of the broader context in which organizing practices occur. Similarly, Leonardi (2013) observes that complicated sociomaterial philosophies seem far removed from the study of actual organizations, in general, and the impact of technologies, more specifically. He ponders: "how we might turn a philosophical discussion into practical theory" about sociomateriality (Leonardi, 2013, p. 60)? To develop practical theory, Jones (2013) suggests sociomaterial researchers examine how, where, and in what ways the social and the material become entangled in organizations. In addition, Paananen (2020) recommends a more nuanced exploration of the ways the social and the material interrelate by examining the real work practices of people in organizations. We embrace both of these recommendations in this paper.

2.1. Sociomaterial theories

Sociomaterial theories differ in their ontologies of the separability of the human and material, using words such as entangled, fused, intertwined, mangled, assembled, and inscribed to describe the interrelatedness. Distinctions are largely based on how the social and the material interact. For some authors, the social and the material are inseparable, and for others, the interrelatedness centers on distinct agencies (Paananen, 2020). For example, Orlikowski and Scott's (2008), p. 456) *agentic realism* is based on an ontology of fusion, reflected in their observation that "the social and the material are inherently inseparable." On the other hand, Leonardi's (2011) ontology of *critical realism* treats the social and the material as distinct but interdependent realms, overlapping like interlocking tiles on a roof, creating a fixed system; this metaphor is applied in the field of computing, for example.

One of Pickering's (1993), p. 565) unique contributions is to highlight the role of emergent actions and intentions in the sociomaterial process, stating, for instance, that "humans differ from nonhumans precisely in that our actions have intentions behind them." Pickering's (1993, 1995) mangle of practice theories illuminate how humans and the material reconfigure each other through practice in a "reciprocal and emergent intertwining" (Pickering, 1995, p. 15), a process he describes as a "dance of agency" (Pickering, 1995, p. 14). Pickering also highlights the relevance of context in his use of the metaphor of the mangle—a laundry aid which flattens garments through two rollers to wring water out—to illuminate how seemingly disparate factors can irreparably transform one another over time, often with unforeseen outcomes in undesirable ways. Pickering (1993) therefore suggests that researchers should rethink agency in terms of performance or "doing things with things" in ways that are constitutively engaged with the surrounding environment, rather than focusing on stated intentions or measurable facts.

2.2. Tuning

Another of Pickering's helpful theoretical contributions is his emphasis on how human and non-human actors mutually constitute one another through a reciprocal play of resistance and accommodation called "tuning" (Pickering, 1993). By "resistance" Pickering loosely means the obstacles blocking a human's goal achievement, and by "accommodation" he means the development of an alternative path to circumvent those obstacles. The idea of resistance, accommodation, and intent is important in our policing study because "while humans may intend to utilize the material in certain ways, intentions are not always realized as material agency resists manipulation in unexpected ways" (Symon and Pritchard, 2015, p. 243).

An example of Pickering's recursive tuning processes of resistance and accommodation can be found in our introductory scenario. During a routine policing event, Officer Potter intended to reach for her yellow plastic Taser, not her black steel handgun, but material

agency resisted—causing her to confuse the two weapons—and then accommodated—allowing her to draw the pistol on her right hip. Assuming the weapon she held was the Taser she had just pulled from her holster, she cautioned "Taser!" and fired, intending to stun the perpetrator. The pistol in her hand accommodated by firing, but exercised its own material agency, killing the victim. Through this dance of agency, it is clear that if policies did not require Potter to carry both a pistol and a Taser, she would have had neither the opportunity nor the misfortune to mistake the two weapons. Daunte Wright would still be alive, and Officer Potter would still be policing the streets of Minneapolis.

2.3. Risk

Risk, risk work, and *risky work settings* are distinct concepts, each of which influences policing, but in rather different ways. *Risk* is the potential for harm to ensue (Giddens, 1999). In contrast, *risk work* emerged in the literature as a way of organizing societal anxieties about risk, satisfying peoples' desire to feel in control (Power, 1997). Thus, risk work aims to avert harm by "transforming future uncertainties into knowable, calculable, and manageable risks through scientific methods" (Hardy et al., 2020, p. 1037), no matter how impractical or unrealistic. Studies note contemporary organizations are increasingly preoccupied with measuring and controlling risks yet, paradoxically, are often ill-prepared to successfully manage them (Tsoukas, 1999). Practices of risk work are generalized, extending across environments, to some extent unrelated to the degree of risk; these are characteristics of what Beck (1992) termed the *Risk Society*. In sum, society attempts to organize risk through planned, top-down development and implementation of prescribed policies, plans, and protocols that are informed by past experiences and intended to control future events, as they unfold in real-time (Hardy et al., 2020; Hardy and Maguire, 2016).

Finally, *risky work settings*, also called extreme contexts (Hallgren et al., 2018; Hannah et al., 2009), are environments where people put themselves in harm's way performing their professional duties even though there is a likelihood of extensive physical, psychological, or material consequences for organization members. Although some risks can be quantified in risky work settings, uncertainty is common with potentially disastrous results of unknown probability (Hardy et al., 2020). Characterized by a "near-constant exposure to potentially extreme events" (Hallgren et al., 2018), policymakers in risky work settings often take a calculative rationality approach in which "an unusually great degree of emphasis is inevitably placed on the reliability of systems and the particular routines, processes, and materials these involve" in order to demonstrate control and purportedly contain risk (Hallgren et al., 2018). For example, U.S. law enforcement policies often require police to carry both a handgun and Taser—risking weapon confusion as Officer Potter and others experienced—to project an image of de-escalation and the intent to avoid deadly force when subduing violent or uncooperative suspects. This normalizing of risk may prove effective in familiar and routine situations. However, problematizing is required to understand how risk is constructed when faced with uncertainty in the fast-paced and ambiguous situations often found in risky work settings such as policing.

To address the prospectively non-quantifiable risks, Hardy et al. (2020, p. 1054) recommend practice-based research studies to "ascertain the significant role that corporeality and materiality play in organizing risk." Except for Cornelissen et al. (2014), Hawkins (2015), and Paananen (2020), few studies in risky work settings adopted a sociomaterial approach. While the literature on socio-materiality in high-risk work settings is under-developed, Whiteman and Cooper (2011, p. 889) explain that theorizations of socio-materiality could contribute to the understanding of how risk unfolds in risky work settings by demonstrating "how social processes create and, in turn, are influenced by, human artifacts, such as tools and other material objects, which are in themselves materially produced through human processes." Scholars of risk have also identified the need for practice-based studies, highlighting the relevance of materiality to understand the risks to individuals in organizational settings (Hardy et al., 2020). At the same time, very little consideration within prior literature has been given to how the presence and intensity of risks encountered shape sociomaterial practices. In this paper, we build on these calls to examine how human and non-human agency become enmeshed in the high-risk work setting of policing.

3. Research design

We embrace Cornelissen et al.'s (2014) suggestion that researchers of risky work focus on evaluating the influence of various aspects of materiality, such as the agentic role of specific non-human artefacts in framing human behaviours and cognitive processes within a particular context. Through our study of U.S. and U.K. policing, we join Maguire and Hardy (2013) to examine sociomaterial processes through which police practices "become" more or less risky. Both London and New York are high-profile international cities covering broad geographic areas (620 mile^2 and 469 mile^2) with well-established police, set up in London in 1829 and New York in 1845, and operate with large numbers of police (30,302 and 36,000, respectively). These commonalities allow us to generate meaningful findings about frontline policing practices (Bayley, 2016).

3.1. Policing in context

The lethality of the weapons routinely allocated to police officers and the instructions that guide their use vary across time and place (Bayley, 2016). In the United Kingdom, police only carry firearms under special circumstances and most officers seem to like it that way. For example, a 2016 poll found that 82% of British police officers prefer not to work armed (Noack, 2016). In contrast, nearly all U.S. police carry guns both on- and off-duty under the assumption that deadly force may be required in the service of their duties or for protection (NYPD, 2013). U.S. police are authorized to shoot if they believe there is a reasonable perception of a grave and imminent threat (Goldhill, 2016).

The contrast between U.K. and U.S. weapon allocation to police results from a variety of cultural, political, and historical factors. British policing is founded on a philosophy of "policing by consent" that considers police "citizens in uniform" who gain their authority and exercise their powers through the consent of the people (Charman, 2018; Wakefield and Fleming, 2009). The title of this paper—*"Keeping the Queen's Peace"*—was mentioned by a London police constable interviewed in this study as an example of how he views his "citizen in uniform" mandate. Carleton (1953, p. 10) explains "the Queen's Peace" established that lawfulness was the responsibility "of the whole community and that everybody shares equally in it." In contrast, American policing is typically considered "law enforcement," with police gaining authority through weapons and force, not citizens' consent per se.

Owning firearms has been traced to America's colonial past and frontier roots; contemporary gun policies and ownership practices reflect that history (Kaufman, 2001). The U.S. Constitution asserts the right of the people to keep and bear arms to form a well-regulated militia, and current interpretations construe this as an individual right to be armed. Today, over 22% of Americans legally own weapons, in addition to a significant number of unregistered gun owners (Spitzer, 2018). Self-defense is the main reason Americans report purchasing a weapon. Studies have found that holding a gun distorts how people view the world. An armed person is more likely to perceive others as a threat and assume they are armed, a bias called "gun embodiment" (Rabin, 2023). In the early days of the Covid pandemic, prospective gun buyers were found to be more fearful of uncertainty and more likely to report the world as dangerous than non-gun buyers. As a result, 22 million guns were sold in the United States in 2020 alone — a 64% increase over 2019 (Rabin, 2023).

In contrast, to become armed in the United Kingdom, individuals must prove that they need a firearm, not just want one, and that they are not a danger to society. As a result, in 2021 only 539,212 people in the United Kingdom held a firearm or shotgun certificate (U.K. Home Office, 2022), making the rate of gun ownership extremely low in a population of 67 million people. The U.K. police can also rescind the privilege of gun ownership if there is evidence of instability, such as drug or alcohol abuse, domestic violence, or personality disorder (Casciani, 2010). Perhaps unsurprisingly, fewer guns result in fewer shootings. U.K. police officers fatally shot 77 people over the three decades between 1990 and 2020, while U.S. police fatally shot 1009 people in 2022 alone (Washington Post, 2024). In sum, there are significant differences between U.K. and U.S. contexts when considering social and material influences in contemporary police practices. However, as our findings demonstrate, there is also significant overlap when considering the variety of weapon-related factors that are brought together in the mangle, both enabling and constraining police tactical options, often with dangerous consequences.

3.2. Research settings

We collected empirical materials from police officers ($N = 61$) in the London Metropolitan Police Service (the Met) in the United Kingdom and the New York Police Department (NYPD) in the United States over a four-year period between 2013 and 2017. These two settings were primarily selected because of the different weapons allocated to police officers, and therefore the potential to generate data that reveals how sociomaterial practices manifest in two culturally distinct risky-context work settings. In the United Kingdom, police are not routinely armed, and only specially trained firearm officers are authorized to carry guns. The guns carried by U.K. firearm officers are determined by the chief constable of each police force, but tend to include a combination of small sidearm pistols and semi-automatic rifles. London police officers are therefore routinely unarmed, with only approximately 8% of officers authorized to carry a gun. In contrast, almost all American police officers are armed both on- and off-duty. NYPD regulations specifically dictate which manufacturer and model of weapon is acceptable for police to carry (NYPD, 2013).

3.3. A study in two phases

We conducted our study in two phases. In phase one, we initiated contact with study participants via an email introduction by a retired NYPD lieutenant, who was a colleague of the first author, and then identified other participants through "snowball sampling" (Goodman, 1961). The first author interviewed a total of 23 London and NYPD police officers in their off-duty time. Initially, the aim of the study was to better understand police officers' work-life experience. Participants were aware that they would be asked open questions to provoke an exchange about frontline policing. Interviews lasted approximately one hour, and all participants consented to their interview being digitally recorded and transcribed.

Two things quickly became apparent during data collection. First, police officers frequently shared narrative accounts about risky situations they had survived at work. Second, the presence, or absence, of a gun was a strong motif throughout these accounts. Intrigued by these narratives, we embarked upon phase two to specifically investigate the constitutive entanglement of the social and the material in frontline policing. Following a purposive sampling logic and building upon the access gained in the first phase of the research, an additional 38 London police officers (both armed and unarmed) were invited to participate in the study through a snowball sampling technique. We focused on London police in phase two because, in many cases, these officers had experience with both armed and unarmed policing practices in their careers.

As in the first phase of the study, the first author conducted individual interviews. At the start of each interview, she told the participant that the purpose of the study was to understand how police officers experienced high-risk events in their daily work lives. Individual interviews lasted between one and two hours, and were largely unstructured to illicit detailed narrative accounts of participants' frontline policing experiences. The interviewer used a small number of open questions and prompts (e.g., "Tell me about a time when you felt threatened?") and followed-up on themes from the interviewees' narratives (e.g., "Do you think having a gun affects what you do?").

Phase two also included focus groups as a way to elicit detailed operational experiences about police practices. Six focus groups,

each with four to six participants, were undertaken. With the consent of participants, the full duration of each focus group was digitally recorded and professionally transcribed. Focus groups typically involve "group discussions, in which participants focus collectively upon a topic selected by the researcher" (Wilkinson, 1998, p. 182). Although an interview guide was developed, focus groups were intentionally informal, interactive, and largely unstructured, allowing participants to actively engage with each other about emerging themes (Morgan, 1996). Through this process, participants encouraged each other to offer responses of a depth and detail often impossible to obtain during one-on-one interviews.

3.4. Data analytic technique: Narrative analysis

The study uses narrative analysis to explore high-risk encounters that occur within frontline policing practice, analyzing human actors' reports of their intentionality and their recounting of the temporal ordering of specific events (Andrews et al., 2008). Orlikowski and Scott (2008) suggest researchers adopt a narrative approach to overcome the challenging nature of sociomateriality studies. In line with this advice, Symon and Pritchard (2015, p. 247) used narrative analysis in a study about the interaction between smartphones and people in a railway company, examining how "materialities such as place and technology are brought together with other agencies (self, other employees, organization) in a holistic re-performance of the event." Similarly, following Kenny et al. (2011), p. 26), we sought to arrange "events and characters in a meaningful way" during our data analytic process. We recognise that these accounts are only "partial indicators of what really happened" (Van Maanen, 1980, p. 145). However, the retrospective nature of such narrative accounts can provide insight into risk, which is also organized retrospectively in the sense that "earlier prospective and real-time organizing of risk is held up to scrutiny" (Hardy et al., 2020, p. 1039). Following Dick's (2005) police study, we believe our narrative analysis approach helps the reader understand the risky work world of our police respondents and how they retrospectively analyze risks in the cases they have chosen to recount.

To analyze the data, transcripts were imported into the qualitative software package *Nvivo 12* to enable easy access to, and the handling of, the large textual dataset generated. Through an iterative process involving all authors, we coded and re-coded the data until we felt that we had identified themes that had internal homogeneity (i.e., coherence of data to theme) and external heterogeneity (i.e., clear difference between themes). Where appropriate, themes were combined within a suitable theme or sub-theme. In this step, we were able to identify a range of potential influences on our identified narrative extracts.

Initially, we identified 27 textual extracts that involved police officer narrative accounts of high-risk events experienced as a result of their police role, whether armed or unarmed. To analyze these extracts, we coded in *Nvivo* "for patterns of similarities and differences in the stories participants told of their experiences" (Symon and Pritchard, 2015, p. 247), as well as for the effects of weapon availability and type of policing practices. Next, drawing upon Pickering (1993, 1995), we examined our coding for evidence of social and material agency in practice, and specifically for how interactions over time brought out the dance of agency of the social and the material. Through this process, we became aware of the human and non-human elements in police narratives, and the intermeshing of agency in different situations. This step helped us move beyond any obvious differences between the accounts of London and NYPD police officers to consider more subtle points of commonality, such as the shifting materiality of guns and human agency during risky work situations. In sum, we focused on these commonalities in our final data analysis, identifying three key narratives that ran through our data exemplifying aspects of the "dance of agency" in day-to-day police practices: 1) "*I had a gun, and almost…*"; 2) "*If I had a gun I couldn't…*"; 3)"*If I had a gun, I would have….*" All names referenced in quotations are pseudonyms.

4. Findings

4.1. "I had a gun, and almost…"

A common observation made by both U.S. and U.K. study participants was that if police carry a handgun there is always a risk of shooting an innocent person, losing the gun to a criminal, or having the gun used against them. The very presence of the gun changes human agency (Cooren et al., 2012), altering the risks. The gun demonstrates material agency by altering human action (Leonardi, 2011). Supporting this reality, Fred, a senior NYPD officer, described a high-risk incident he experienced early in his law enforcement career:

> "*I remember fighting for my gun many years ago…I went to stop a guy who was breaking into a car. I was in civilian clothes and it was before cell phones, and when I grabbed him coming out of the car. I had my gun out…We call them 'off-duty guns' because they're smaller and easier to carry. He turned quickly and he grabbed the front of my gun and he started to fight with me. I took the gun and I hit him as hard as I could in the head with it, and his head began to bleed a lot…We went down to the ground fighting over the gun…I just hollered, 'Call 911 and tell them the police need help' and several people stopped…We got him in cuffs and we got him to the station.*"

In this example, we see the mangling together of policies, cultural context, means of communication, and police tools in this police officer's practice. In this case, NYPD policy specified that police officers must carry a gun both on- and off-duty unless there is a specific reason not to be armed. In effect, police officers are never really off-duty, presenting a risk in and of itself. When the off-duty officer encounters a crime in process, he is guided to use the gun, a material artefact he is required to carry by NYPD policy. Notwithstanding the NYPD's policies and prescribed procedures, the police officer responds to the uncertainty in the moment through a dance of agency with the gun.

Fred's narrative shows how carrying the gun can heighten the risk of escalation; without the gun, he would make a different calculation. The gun accommodates a lethal outcome, but his repurposing of the gun from a deadly firearm to a non-fatal striking tool is

an instance of resistance according to Pickering. At the same time, the suspect resists the gun's agency by attempting to take the gun away from the police officer. When the officer resists the suspect's effort, the gun accommodates by enabling a different use. The officer uses the gun as a blunt instrument to strike the assailant in the head, causing the suspect to bleed profusely and the officer to gain time consequential to the outcome. The materiality of the gun accommodates this transformation, because it is an "off-duty gun," smaller in size and easier to maneuver than the regulation service revolver. The role of context here is particularly interesting. The officer has confidence in the public's response, and indeed, the bystanders assist by calling 911, summoning police assistance.

The emerging and evolving agentic properties of both humans (e.g., policymakers, police, 911 operators, perpetrators, bystanders, gun designers, etc.) and non-human actors (e.g., car, gun, handcuffs, telephone, 911 line, etc.) mangled together, allowing the police officer to avoid using the full agency of his potentially lethal firearm in ways he might later regret. Fred recalled the emotions of his experience: "I remember I was quite shaken that day…It wasn't about me getting killed. It was the fact that I almost killed somebody—I almost shot him over breaking into a car and how meaningless that would be."

Fred's narrative illustrates how humans and non-humans "are intimately connected with one another, reciprocally and emergently defining and sustaining each other" as they construct risk within a particular context (Pickering, 1995, p. 17). In risky fields of work such as policing, the interactions between humans and non-human actors have the potential to escalate into lethal situations. Yet, human agency can resist, lowering the risks of a lethal outcome. In this case, de-escalation was a result of the police officer's agency, not the result of following organizational routines.

4.2. "If I had a gun, I couldn't…"

Unlike U.S. police, who almost always carry a handgun, most U.K. police do not carry firearms, and many reported to us that they do not want to. Andy, a senior London firearms officer, explained that the agentic nature of the gun narrows the range of tactical options available to him, potentially escalating risk in his everyday police practice:

> "If I have a weapon, arguably, it reduces my capability to use other tactics. I can't roll around on the floor with someone if I've got a weapon. I could, but it would be risky because they could take the weapon. So, if I've got a weapon, it really does limit the tactical options that are open to me."

In this example, the gun is envisaged to impart a different form of material agency than in the previous U.S. examples. The gun prescribes certain human limitations, constraining the tactical options which this officer thinks he can safely pursue. The experience of policing without a firearm leads this officer to prefer working unarmed as a way to eliminate the weapon's agentic qualities altogether, thereby minimizing the risk to life.

In a similar example, Linda, an experienced London constable, describes how the agentic properties of a handgun could negatively impact her police practice, prescribing her actions towards the use of maximum force in situations that may not warrant it:

> "Every time [U.K. police] deal with a suspect you have two people, like at an angle, so you're outside of that person's fighting arc. One person will engage and be talking [to the suspect] and the second person's job is literally just to watch that person and check where they're putting their hands—or if they notice something. Obviously if they had a knife, if they could see it in their pocket, they'd say to the suspect—not moving eyes off the person—they'd say, 'I think he's got a knife in his pocket,' and then that person can go, 'Fella, do you have a knife?'…And if they go for the knife, the worst that's going to happen is we're going to grab them. If we had a gun pointing at them…Well, what do I do? You've already taken your maximum force here. So, you can only go to the final step, can't you? You've got no in-between. You can't grab them because you're like, 'Well, I don't want them to grab my gun.'"

Linda works unarmed, and describes here how the presence of a gun would restrict the range of options available to her in practice. Paradoxically, by not having a gun, she believes her human agency is less restricted, and the risk that comes out of the mangle is therefore diminished. Instead, the police officer's agency is amplified by the agency of another human, not a weapon, allowing the team to coordinate a range of tactical interventions, which would be unavailable to them if they were armed. This narrative reveals a dance of agency between police officers which aims to de-escalate tensions and reduce risk, by eliminating the presence of a gun. The officer has already thought through the temporal emergence of risks and explains how the material agency of a firearm in this situation would have left few policing options available, forcing humans to exercise the "maximum display of force" and shoot the suspect if a knife becomes drawn. Thus, U.K. policymakers' decisions to not arm Met police provides frontline officers with tactical options to better contain the mangle of risk in their policing practice, potentially reducing danger for officers, suspects, and the community. Of course, this practice is embedded in the U.K. culture of policing by consent, which seems to make U.K. police more wary of the gun's material agency than U.S. police.

4.3. "If I had a gun, I would have…"

The third narrative identified in our study is one in which unarmed police officers describe a difficult work situation encountered firsthand in which they realized that the agentic qualities of a firearm might have escalated the mangle of risk, causing the situation to end more violently. For example, Malcolm, an unarmed London officer, describes a challenging day early in his policing career:

> "When I was a probationer…a call came out—two guys in the street fighting…We turned up and there were two guys squaring up to each other with a machete and a hammer. So, I got out the car and I walked towards them and started shouting at them to put their weapons down and—as often happens when the police turn up—they forget the fight with each other and they turn on you. And these two guys

> *then came at me, and that was the first point in my career when I thought, 'I'm in the shit now…I could get quite badly hurt here.' And I just yelled a load of profanities at them…telling them to put down what they had—and they did! They put their weapons down…I don't think they had any real intention to cause me harm. They were both very, very wound up; very animated. But because I gave them some very explicit instructions on what they needed to do, they did it. And if I'd had a gun and if I'd have been trained differently, I'd have shot them both dead…and that would have been a tragedy, I think."*

In this vignette, Malcolm demonstrates the evolving agentic properties of both humans (e.g., policymakers, trainers, police, street fighters, etc.) and non-human actors (e.g., hammer, machete, police uniform, etc.). The situation Malcolm describes is highly uncertain, given that the assailants had weapons and were "very wound up." The dance of agency is brought out in how a police officer's uniform, body language, tone of voice, and confident demeanor can be used to redirect how risks are mangled. The assailants initially resist police efforts to get the situation under control, forcing the police officer to accommodate the material agency of their weapons. Subsequently, the police officer exerts agentic force—that is, resists the assailants—by yelling "profanities" and giving "specific instructions," and the street fighters eventually accommodate him. If the officer had been trained differently and armed with a gun, he notes, the escalating tension of the situation and the gun's material agency might have dominated, resulting in fatalities. In this case, we see that U.K. policymakers' decision to not arm London police mangles with policing practice, serving as an example of how the British "policing by consent" model can, in the eyes of this police officer, lead to a de-escalation of the risks.

In another example, Mark, an unarmed London constable, provides a similar illustration of how unarmed police can engage in less aggressive community policing, thereby reducing the risk of harm:

> *"I had a situation where it was Christmas Day, working on my own…I got called to a domestic incident, a house I'd been to numerous times before. A guy who was an ex-soldier had a drinking problem and his wife would ring up because he was getting out of hand, start smashing the place up. I got there and got the wife out…[and] let him direct his anger towards me to try and keep her safe. He was saying a lot of stuff derogatory towards me and I just sort of—obviously I wasn't agreeing with it—but I sort of took it thinking if I went in there all guns-a-blazing then that's only going to up the ante with him. So, I just let him have a few minutes to vent his anger and hopefully calm himself down, which it did eventually…[I] don't take it personally, because at the end of the day it's the uniform—and the authority—they're shouting at."*

In this narrative, the police constable describes the agentic power of police symbols, such as his uniform, and the ways symbols of policing can impact the community. He observes that if he arrived on scene with "guns-a-blazing," the material agency of the weapon could "up the ante" with a suspect in an already hostile situation. Without interference caused by the agentic forces of a firearm, the officer feels he can better manage the unfolding situation, safely relocating the victim and then more flexibly accommodating the suspect's agitation, allowing him to "vent his anger" in order to eventually "calm himself down." Recognizing that the suspect's anger was influenced by the materiality of the police uniform and its potential to exercise material agency over the suspect, the officer is able to detach from the aggression, de-escalating the interplay between social and material factors, and reducing the risk of injury and additional property damage.

5. Discussion

The subtitles and narratives offered above demonstrate the powerful agency material objects can have over humans' thoughts, actions, and behaviours. As we have seen in the vignettes presented, life-threatening challenges can materialize in unpredictable and unexpected ways in risky work settings. Our framing— "I had a gun and almost," "If I had a gun, I couldn't," and "If I had a gun, I would have"—illuminates how police officers' actions are framed and constrained by the material agency of a weapon, impacting operational capabilities. For example, the framing of "I had a gun and almost" shows how the presence and agency of a gun can escalate the aggression of a policing response. The framing of "If I had a gun, I couldn't" illustrates how the presence and agency of a gun can physically constrain human agency, limiting response options. And finally, the framing of "If I had a gun, I would have" demonstrates how the mere presence of a gun can influence community response, causing some police to prefer working unarmed in order to reduce the likelihood they would do something they later regretted. Together, these narratives shed light on how the enmeshment of human agency and the material agency of the gun serve to up the ante of risk experienced in high-risk contexts and shutdown alternative policing options. These findings suggest that unarmed police may counterintuitively have a broader range of policing options available to them than those armed with a gun. In sum, technologies designed to manage risk can paradoxically increase it for both police and society.

5.1. Defining the mangle of risk

In this paper, we use the mangle of risk to analyze the sociomaterial processes through which police and the community become entangled in risk work. The policies, procedures, and protocols intended to mitigate danger—such as weapon design, police policies, government regulations, societal expectations, and cultural history—can escalate the potential for harm to ensue, revealing how situations "become" risky during police practices.

> *We define the mangle of risk as complex co-creational sociomaterial processes that become entangled with an organization's risk work, escalating the potential for harm to ensue in extreme contexts.*

Through this theorization, we critique policy approaches reliant on scientific methods designed to transform future uncertainties into

identifiable problems with prescribed solutions.

Examining practice in the narratives of police officers who were caught in risky situations leads us to problematize scientific paradigms of risk construction, questioning society's assumptions that risk can be effectively normalized and controlled through planned, top-down development and implementation of prescribed policies, plans, and protocols, informed by experts and past experiences. As with Pickering's mangle of practice, our mangle of risk is a complex phenomenon that is shaped contingently by actions, intentions, context, culture, and time. We demonstrate how these factors come together, through the mangle, affecting workers' and the public's exposure to danger, which are outcomes characteristic of risky scenarios.

Study of the mangle of risk is of high policy relevance because, paradoxically, intentions to control risk through the use of risk management tools have sometimes escalated risks through failing to take into account how "human and material agency are constitutively enmeshed in practice" (Pickering, 1993, p. 567). Our analysis reveals how certain contextual gun-related policies (e.g., armed, unarmed, off-duty weapons, etc.) entangle with the physical properties of guns (e.g., Taser, pistol, P320, etc.) to affect the risks and outcomes of police practice in unintended ways. We argue that a distinctive mangle is required for high-risk work because professionals in high-risk work settings are more likely to experience surprise or rapid temporal emergence (Schakel et al., 2016) than those operating in lower-risk fields with slower trajectories of temporal unfolding (e.g., Pickering's focus on the scientific process). And particular operational challenges, such as communication and coordination issues, escalate when making decisions under intense time pressure (Schakel et al., 2016).

Second, we explicitly recognise that risk reduction is a particular type of goal which may be subverted by the interaction between human and material actors under pressure, leading to risk escalation. This is an important step, as Pickering (1993, p. 577) argues, "resistances that are central to the mangle are always situated within a space of human purposes, goals, and plans." Therefore, the nature of the specific goal plausibly shapes the nature of the enmeshment between human and non-human agency. We also recognise that human agency, and goals, are often enacted in response to material agency. For example, in relation to technology, people adapt their actions to the constraints of the design (Leonardi, 2012). Relatedly, we follow Pickering (1993) to observe that while human and material agencies are enmeshed, only humans have intentions. This observation about intentionality and sociomateriality is particularly important in the context of high-risk work settings because the decision to use (or not use a tool) might lead to loss of life.

Third, as we have shown, the recursive nature of the tuning process is distinctive. The police officers' accounts of material agency suggest multiple iterations between resistance, blocks to the goal of risk reduction, and accommodation that develop alternative approaches towards the goal. These findings therefore help to explain why under certain conditions the tools supplied to control risk can, counterintuitively, escalate danger in unpredictable ways. For example, the requirement for U.S. police officers to carry both a Taser and handgun escalates the mangle of risk when compared to U.K. police, who do not routinely carry firearms. Finally, our international comparison allows us to find further empirical support for Pickering's (1993, 1995)) observations about the importance of contingencies such as culture, time, and place, influencing human and non-human agency in practice.

In sum, our narrative analysis of police events supports previous research reporting that a weapons effect primes people to think and act more aggressively in the presence of weapons (Anderson et al., 1998), increasing the likelihood that force will be used (Ariel et al., 2019). Across the different policy and societal contexts, particularly in relation to guns, both NYPD and London police officers identify the potential for the presence of guns to bring about more extreme outcomes than is desirable. Although it may seem counterintuitive that London police prefer to work unarmed, respondents universally reported that having a firearm reduced, rather than increased, their tactical options on the frontline in the U.K. context. Our findings show how in both New York and London, tools enable and constrain frontline operators by prescribing a specific range of human responses which are normalized as part of organizational routines (Leonardi, 2011). Thus, police officer agency and response options are pre-shaped by a range of macro-forces and risk work before officers even encounter a frontline challenge within their community. If U.S. police officers, like Officer Potter, were not required to carry both a handgun and a Taser, there would be no opportunity for them to be mistaken and fired erroneously. In sum, the dynamic interaction between the agency of human actors (e.g., policymakers, weapon designers, police, suspects, bystanders, etc.) and non-human artefacts (e.g., police uniform, gun, handcuffs, 911, etc.) constructs risk and impacts policing practice in real time. The mangle of risk demonstrates how frontline operators' actions can be prescribed by a range of social and material influences, creating "accidents waiting to happen" for unfortunate individuals caught up in the resistance and accommodation of the social and the material.

5.2. Contributions

The findings reported here form the basis for three key contributions to sociomaterial research. First, we join Cornelissen et al. (2014), Hawkins (2015), and Paananen (2020), who advance sociomaterial studies of risky or extreme contexts, by illuminating the ways in which frontline human operators are enabled and constrained by the material agency of the technologies of their job. Through this examination, this article heeds the call of sociomaterial scholars to avoid abstractions and study organizations—and real people's practices within them—as a way to advance management and organization studies. Police officer narratives offer real-world examples of an under-researched sociomaterial phenomenon, illustrating how their practices are influenced by a range of historical, cultural, political, technical, social, and material factors which can culminate in situations where the gun's agency comes into play in a mangle of risk.

Second, by examining risk construction in police practice, we provide an example of a generative new analytic strategy for scholars of risky work or extreme contexts to consider when studying frontline practices (Bechky and Okhuysen, 2011; Campbell et al., 2010; Fraher, 2011; Hallgren et al., 2018; Hannah et al., 2009). Bringing sociomateriality into the study of these contexts has the potential to invigorate a field that literally has life or death implications. Sociomateriality is particularly applicable in police work, where material

artefacts are an integral part of the use of force, and where the range of previously unexperienced circumstances in which officers can find themselves is high. The application of the mangle of risk in this article furthers our understanding of how risk escalates because it reveals how frontline operators' work practices are constitutively entangled with a variety of factors, which in turn influence how the human and material interact to construct risk.

Finally, we extend Pickering's (1993, 1995) mangle theory by defining a specific application of the mangle of practice, a phenomenon we term the mangle of risk. As technologies become increasingly prevalent in the contemporary workplaces of risky professions, understanding the complex mangle of risk between human and non-human actors during frontline practice becomes paramount. For example, aviation studies have found that as technology expanded on airline flight decks to include agent-like flight control systems with high levels of autonomy and authority, unanticipated burdens were placed on pilots who struggled to stay abreast of the state of the automation (Billings, 1996; Norman, 1990; Sarter and Woods, 1994, 1997). The agentic nature of these new technologies increased human distractions in unanticipated ways, instead of decreasing workloads as system designers assumed. Researchers identified a dangerous state of human confusion called "automation surprise" that occurred when non-human systems did not behave as humans anticipated. And other unexpected problems surfaced as pilots struggled to shift their role from "operating" flying machines to "communicating" with technology, as if it was a virtual crewmember (Card et al., 1983). To address this dangerous problem, humans were trained differently in order to think like non-human technology, developing a sophisticated knowledge of the programming, intentions, and operating parameters of their automated systems in order to anticipate its operations (Fraher, 2015). The recent fatal crashes and subsequent grounding of the Boeing 737 Max airliner demonstrates the continuing challenge of managing the interface between humans (e.g., aviation regulators, airplane designers, airline trainers, pilots, customers, etc.) and non-humans (e. g., airlines, airplanes, automation, etc.) in aviation's mangle of risk (Gelles and Kitroeff, 2019). Similarly, future studies of fields of extreme contexts—such as healthcare studies of operating teams' performance using new technologies (Edmondson, 2003; Edmondson et al., 2001), military studies of degraded performance due to human-non-human confusion in battle (Snook, 2000), offshore oil platform practices in the petroleum industry (Østerlie et al., 2012), smokejumpers' use of firefighting tools (Weick, 1993), and the influence of powerplant design on team performance during malfunction (Milosevic et al., 2018)—could benefit from adoption of the mangle of risk framework as an analytic tool. Conceptualizing this mangle of risk by decentering the human operator as the sole source of agency in extreme contexts work can help advance our understanding of organizing processes in a wide range of contemporary organizations, highlighting the complexities of risk construction processes (Orlikowski and Scott, 2015).

6. Conclusion

Our study of contemporary policing practices in New York and London explores how police deal with and think through high-risk situations as a "dance of agency" between humans and material objects. Sometimes activities play out according to expectations, and sometimes they do not. Human and non-human actors mutually constitute one another in a reciprocal tuning that involves resistance and accommodation. We demonstrated that although the material properties of non-human artefacts do not physically change, the material capacity changes significantly when enmeshed within context-specific phenomena, potentially escalating danger for police, suspects, and the community in a mangle of risk. Police in this study unanimously describe the agentic role non-human artefacts like guns play in: a) framing their cognitive processes, b) influencing their behaviour and decision-making processes, and c) impacting individuals around them.

Our development of the mangle of risk construct helps illuminate how historical, cultural, political, and technical factors that may have developed months, years, or even decades earlier can still influence everyday frontline operational practices in extreme contexts work. Our analysis revealed that by normalizing risk, decision-makers paradoxically increased risk in some situations. Findings here indicated that sociomateriality, in general, and the mangle of risk, in particular, offers a fruitful analytic approach to examine the practice of risky work and risk construction processes. This study demonstrated the complex co-creational processes through which both police and the community can become entangled in an escalating mangle of risk that is beyond the control of any one individual. By applying the mangle of risk to the study of extreme contexts, we illuminate how police officers are only one element in the complex interplay between social and material factors. When we give people tools in risky work environments—like a Taser and a handgun—it seems inevitable that someone will confuse the two at some point and people will get hurt. Perhaps it is time to think more proactively about the dynamics of risk construction, and what society expects professionals working in high-risk environments to do and why, before deciding which tools will best accomplish intended goals.

Author statement

CRediT authorship contribution statement

Amy L. Fraher: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Shireen Kanji:** Conceptualization, Data curation, Formal analysis, Writing – review & editing. **Layla J. Branicki:** Conceptualization, Data curation, Formal analysis, Writing – review & editing.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

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