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Constructing Crime in a Database: Big Data and the Mangle of Social Problems Work[1]

Abstract This paper argues for programmatic change within social constructionist approaches to social problems by attending to materiality in the theoretical conception of social context. To illustrate how this might be done, we place the interplay between social problems construction and technology (what we refer to as the mangle of social problems work) at its center by examining how the advent of "big data" is impacting the construction of social problems. Using the growing field of intelligence-led policing (ILP) as our illustrative example, we will examine four effects the large scale collection and analysis of data has on the way social problems claims are made. We begin by arguing that big data offers a new method by which putative problems are discovered and legitimized. We then explore how large data sets and algorithmic data analysis are increasingly used for predicting future problems. Following this, we illustrate how big data is used to construct and implement solutions to future problems. Lastly, we use the interplay between big data and those who use it to illustrate "the mangle of social problems work," where data is made meaningful and actionable through the interpretive and analytic processes of analysts and police officers.

Keywords Big Data; Social Problems Work; Social Constructionism; Science and Technology Studies; Intelligence-Led Policing

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Over the past decade, several leading figures in the social constructionist approach to studying social problems have warned that the theory is on the verge of irrelevance (Best 2003). They argue that constructionist theory has become stagnant, insular, and preoccupied with case studies that contribute little to the advancement of the theory. We share their concern. As such, we offer a place to begin theoretical advancement in social constructionism and social problems research by attending to the essential role that materiality, specifically technology, plays in the construction of social problems and social problems work, a topic that largely has been ignored in constructionist analyses.

To this end, we adopt Andrew Pickering's (1995) concept of the "mangle of practice" as a means to illuminate the intricate connection between humans and materiality and the endless ways in which people must negotiate their goals, intentions, understandings, and activity in response to materiality. To identify the connection between materiality and social problems—what we refer to as the "mangle of social problems work"—is to recognize that the social and technological are interconnected and co-constituted (Latour 1987; Law 1991; Fujimura 1992; Clarke and Star 2003). This paper places the "mangle of social problems work" at its center. We aim to illustrate the essential role materiality plays in the construction of social problems and how social problems work is the result of socio-technical labor. As such, we argue for the integration of materiality into the core concepts of the constructionist approach. We do this through the lens of qualitative studies in science and technology (Latour and Woolgar 1979; Latour 1987; Bijker 1995; Pickering 1995; Clarke and Star 2003). Of course, in one paper, we cannot adequately examine all the roles materiality plays in the construction of problems. Thus, we focus our attention on one specific type of materiality, what we are terming "diagnostic technologies," and their role in one aspect of the construction of social problems: social problems work.

We begin by introducing the "mangle of social problems work," a concept that integrates qualitative studies in science and technology with social constructionist analyses of social problems work. We then illustrate the concept by examining the intersection of "big data" and crime analytics in the field of intelligence-led policing (ILP). We conclude with a call for programmatic change in the study of social problems work.

The Importance of Materiality in the Construction of Social Problems

The social constructionist approach to studying social problems is fundamentally interested in the construction of knowledge (Berger and Luckmann 1966). Social problems claims-making is an exercise in knowledge construction. Claims-makers must convince their audiences of the "truth" about a problematic condition. In doing so, they construct what should and should not be included as part of the problem. What are its causes? Its solutions? Who

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is responsible for solving the problem? The answers to these questions produce the "facts of the matter" that constitute a body of knowledge regarding the problem in question (Loseke 2003; Best 2008). However, knowledge is constructed through symbolic exchanges that occur within social contexts. These contexts matter and constructionists often have examined the various ways in which social problems knowledge is shaped by contexts (Holstein and Miller 1993; 2003; Best 2003).

For example, constructionists have clearly illustrated how the discourse and rhetoric used by claims-makers reflect particular cultures and social structures and are, therefore, not independent of their contexts but instead are a product of them (Loseke 1989; Fox 1999; Best 2003; Irvine 2003). By attending to macro-level socio-structural factors such as cultural themes and feeling rules (Loseke 2003), and micro-level site specific factors such as a declining client base (Pawluch 1996), social constructionist researchers have demonstrated the importance of attending to the interplay between the individuals involved in constructing a problem and the social context in which these activities occur. Yet, absent from much of this research is a theoretical conceptualization of the role materiality plays in the construction of social problems. Although Holstein and Miller (1993) highlighted how social problems work is embedded within organizational practices and sensitive to non-discursive practical circumstances, few researchers have been attentive to material contextual factors, such as technology.

Weinberg (1997) is one of the few social problems theorists to clearly identify the central role non-humans play in the construction of social problems work. Specifically, he illustrates how mental health diagnoses become influential and causal agents in social problems work, and concludes by *implicitly suggesting* that social problems researchers be attentive to the way human and non-human agents produce "the outcomes of social problems work" (Weinberg 1997:231). Yet, it appears that his call has fallen on deaf ears as few social problems researchers are explicitly attentive to materiality. The challenge, we believe, arises from the selective adoption and changing definition of "context." Few contextual constructionists define or operationalize context, incorporating different aspects of context, such as "official statistics" and "structural constraints," while maintaining analytical focus on the claims-making process (Stallings 1995; Best 2003).

Context, as conceptualized here, is *not* a reified state but is instead a fluid and ever changing *human-material construction*. It is something that is actively and interactively constructed by actors in relation with materiality (Latour and Woolgar 1979; Holstein and Gubrium 2003). By adopting Holstein and Gubrium's (2003) conception of context as something actively constructed, we situate the analysis of claims-making on the actions, interpretations, and claims-making processes, while locating these actions within their local and situational work processes. For example, claims-makers, when constructing the grounds of their claims, can employ a variety of technologies to construct the facts about troubling circumstances. Each technology, whether a statistical model used to predict climate change (Rosa and Dietz 1998), or an x-ray machine used in the process of diagnosing child abuse (Pfohl 1977), constructs the world in a distinctive way. The availability of specific technology enables certain discursive worlds to be invoked, their absence cuts off certain lines of action. The esteem with which the public holds the technology affects the extent to which claims will resonate or falter (Joyce 2005). Thus, the technologies used in the construction of knowledge are *inseparable from* the shapes social problems take.

The Mangle of Social Problems Work

The "mangle of social problems work" refers to this co-constituted process in which technology and knowledge of social problems are inextricably linked, or *mangled*, together. The concept draws on Pickering's (1995) "mangle of practice." "The mangle," as Pickering calls it, addresses the interrelationship between human agency and technology, examining how human goals and intentions both shape and are shaped by technology. This process, we argue, can be found within the published research on social problems work. For example, Irvine's (2003:561) study on unwanted pets provides a glimpse of the ways technology can shape the construction of social problems and solutions by illustrating how the standardized classifications provided on bureaucratic forms obscure "the complexity of the narratives offered by clients." Research in science and technology studies have uncovered the ways in which standards and classification systems are "the result of negotiations, organizational processes, and conflicts" that become powerful tools that hide the human labor involved in their development, maintenance, and application (Bowker and Star 1999:44; see also Sanders 2006). Such research has demonstrated how, as more people take up and use these classification systems, they become more natural and durable. "The more naturalized an object becomes, the more unquestioning the relationship of the community to it; the more invisible the contingent and historical circumstances of its birth, the more it sinks into the community's routinely forgotten memory" (Bowker and Star 1999:299). Irvine's (2003) study on unwanted pets illuminates the power of classification systems and the implications of the integration of standardizations and classifications in social problems work:

> [i]f institutions think by providing models through which experience is processed, the reduction of client needs to a selection of prescribed terms on pull-down menus reflects how organizational discourse and practices produce particular characterizations of social problems and solutions. As software increases the capacity for recording the frequencies with which particular terms appear, the institutional model gains strength. (p. 561)

While Irvine did not look explicitly at the role materiality plays in the construction of social problems work, her analysis illuminates how technologies are situationally contingent and relevant, and how their use shapes both organizational practices and the construction of social problems. To better understand the "mangle of social problems work," we now turn our attention to our case study examining intelligence-led policing (ILP) and the use of "diagnostic technologies" for constructing and managing crime.

Intelligence-Led Policing and Diagnostic Technologies

Holstein and Miller (2003:75) argue that human service organizations perform social problems work as "they routinely deal with, and constitute, persons and occurrences as problems." We agree with their assessment and argue that police officers routinely participate in what Holstein and Miller (2003) refer to as the *production of concrete cases*—constructing instances of social problems in everyday interactions. Routine police patrol activities require officers to engage in an interactive process whereby various schemes of interpretation are brought to bear to determine whether a formal instance of "crime" will be produced. In addition to determining whether any part of the criminal code has been broken, officers may consider the comportment and attitude of those involved in the activity, any organizational pressures to produce more or fewer cases of a particular type of crime, and a variety of other factors before classifying an action as a concrete example of criminality.

While the actions of patrol officers are the most visible way in which police services engage in social problems work, police services' adoption of intelligence-led policing (ILP) has led to the development of new social problems workers: crime and intelligence analysts. ILP is "the collection and analysis of information to produce an intelligence end product designed to inform law enforcement decision making at both the tactical and strategic levels" (Ratcliffe 2011:81). Crime and intelligence analysts are responsible for conducting this analysis and producing these "intelligence end products." To achieve this, analysts "de-contextualize and … de-personalize crime data in order to develop an overview of the nature of crime problems … [in order to] … target, prioritize, and focus interventions" (Cope 2004:199). Thus, where police officers produce crimes, crime analysts produce crime patterns (e.g., crime waves and hot spots). By integrating crime analysts and their analytic practices into policing, it is believed that ILP provides police the ability to "scientifically" predict offender activities and "objectively" direct police resources to prevent crime and disrupt offender activity (Beck and McCue 2009; Lavalle et al. 2011).

Key to this intelligence-led approach is the emergence and use of "big data." For the purposes of this paper, "big data" refers to large data sets, including those that "consolidate many datasets from multiple sources" (Wigan and Clarke 2013:46) *and* the tools and techniques used to analyze them. It is about applying advanced analytical techniques to a vast amount of data to infer probabilities and make predictions. "Big data," in the context of ILP, serves as a *diagnostic technology*, which we define as the various tools and analytic practices used to construct the "facts" about a social problem and to identify concrete cases of a social problem.

Proponents of ILP believe "big data" will allow for the most informed and targeted allocation of police resources (Moses Bennett and Chan 2014). They argue that ILP shifts the practice of policing away from an exclusive focus on reactive crime control towards pre-emptive and predictive security, surveillance, and risk management (Ericson and Haggerty 1997; Maguire 2000; Lyon 2003). Where ILP has taken hold, the hope is that police will be able to predict where crime will happen and intervene before it becomes a serious problem. Thus, through the mangle of diagnostic technology and interpretive practice, policing is no longer about what happened in the past, but about *what is happening now, what will happen next, and what actions should be taken in light of the predicted future* (Lavalle et al. 2011). By integrating data collection and statistical crime analysis techniques in the construction of the problem of crime, ILP gives us a glimpse into the *mangle of social problems work*.

Methods

Our empirical analysis draws upon 86 in-depth interviews with 24 crime/intelligence analysts, 1 police chief, 3 superintendents, 2 Staff Sergeants, 26 patrol officers, and 30 officers/civilians working within police information technology bureaus from six different police services across Canada. Interviews ranged from forty-five minutes to three hours, with the average being 1.5 hours in length. All interviews were digitally-recorded and transcribed verbatim. Interview data was supplemented with participation in police ride-alongs, as well as attending three crime and intelligence analytic workshops (2011 Association of Law Enforcement Planners Meeting, 2012 National Institutes of Justice Crime Mapping Conference, and 2013 Regional Crime Analyst Training Workshop), and two (2013, 2014) Canadian Association Chiefs of Police (CACP) workshops on police information technology and information management. Documents also were collected from information technology websites related to crime and intelligence analysis. Adopting a constructivist grounded theory approach (Charmaz 2006), we analyzed these data by identifying and connecting themes related to social problems work.

Findings

Our analysis examines how the "mangle of social problems work" in policing is accomplished through the negotiated labor of police personnel with their diagnostic technologies, such as classification systems, geographical information systems, records management systems, and so on. We begin by discussing how the organizational, political, and technological contexts facilitated, as well as legitimized, the integration of ILP and "big data" into policing practice. Next, we examine how the integration of scientific practices in policing (such as collation and algorithmic processing of large amounts of crime data) provides a veil of objectivity to their constructions of crime and provides legitimacy to police practices. Following this, we illustrate how these constructions are used to predict future criminal activity. Lastly, we explain how this socio-technical labor demonstrates the "mangle of social problems work."

Intelligence-Led Policing As Consolidating and Informing Police Practices

The ascent of big data and intelligence-led policing over the past decade has occurred in the context of three interrelated concerns for policing organizations: 1) concerns about cost, 2) concerns about the consequences of failing to effectively share information across jurisdictions and between agencies,

and 3) a preoccupation with risk management. Big data and ILP have been touted as ways to address these putative concerns by 1) facilitating the creation of more efficient policing strategies and tactics, 2) creating information technology to facilitate the sharing of data across agencies, and 3) identifying risk populations.

For the past decade, political discussions concerning the economics of policing and police sustainability have come to the forefront (Drummond et al. 2012; Public Safety Canada 2014). In response, police services around the world have turned to big data and ILP as a means "to create smart, efficient processes and … to leverage technology to move away from reactive to proactive policing and consequently reduce costs" (2011, Ontario Association of Law Enforcement Planners Meetings). To achieve these cost savings, police organizations have begun to structure their operational, strategic, and tactical decision-making around the collection and analysis of data.

One of the most important steps in integrating ILP into these decision-making arenas has been the use of big data for synthesizing and analyzing crime data, and calls for service. Prior to the advent of big data, police services did not know how to manage and make sense of all the data to which they had access. "There was a clear need to collect, collate, evaluate, and analyze information in a timely manner with the greatest impetus being the overwhelming volumes of evidence and information" (Brewer 2009:1). This information, combined with the ease with which offenders could cross jurisdictions, created concerns about the possibility of important information failing to be passed on to those who most needed it. "Without a common repository, officers lacked a comprehensive view of criminals, robberies, assaults, or gang violence across jurisdictions and in different areas of the city. Making connections between seemingly unrelated data sets was difficult" (Prox 2013:1). In fact, "the inability of the different law enforcement agencies to pool their information … effectively" enabled serious offenders to "fall through the cracks" and "innocent people to die" (Campbell 1996:5). Due to this constructed lack of information sharing, governments identified the need for "better communication between ... departments" (LePard 2010:27) and for the development of "standards for electronic case management software" (LePard 2010:29) to "ensure unified management, accountability, and co-ordination" (Campbell 1996:4; see also Bichard 2004; Sanders 2014).

As a result of this political and cultural context, big data came to be defined as a tool to enhance emergency preparedness by breaking down "information silos" and providing a centralized repository that facilitates comprehensive data analysis. An intelligence analyst explains:

> I'll show you what that means in reality, because when I connect in our database … the capacity on this, we go back to March 21st, 2001, every police incident file, intel file, street check that has been collected since 2001 … to today. So that's 4 billion records. *So when we run a query on this, I'm searching 4 billion records provincially*. (39, Intelligence Analyst, *emphasis added*)

Big data has provided police services the ability to harmonize their intelligence systems by providing:

> the ability to query and analyze data from a multitude of disparate systems … a capability to query data, chart criminal associations, identify tactical and strategic trends, and map the distribution of crime and events. What would normally take weeks [can] now be done in a matter of minutes. (Prox 2012:13)

The ability to quickly retrieve and comprehend data from large data sets enables police to apply their institutional categories and rules to large amounts of data in *manageable* ways for conducting social problems work. What, in the past, would have been information overload—and extremely time consuming—becomes faster and manageable with the integration of technology.

Advocates for ILP legitimize the integration of technology and scientific practices within policing by arguing that big data provides "the opportunity to enter the decision cycle of our adversaries—drug dealers, gang members, terrorists—affords unique opportunities for prevention, thwarting, and information-based response, ideally preventing crime" (Beck and McCue 2009:19). Policing practices, therefore, have been constructed as moving away from reactive crime control towards proactive policing of *risk populations*, drawing on information and risk assessments, calculations, and analysis (see also Ericson and Haggerty 1997). This shift can be understood as reflecting changes in social control and the growth of the risk society. In the risk society, big data and ILP are perceived as essential for keeping police and the public safe by using past dangerous or criminal behavior to predict future behavior in order to manage it. Thus, the broader organizational, technological, political, and cultural contexts have provided *both* justification and legitimation for the adoption of diagnostic technologies for social problems work.

Constructing and Legitimizing Social Problems

The incorporation of big data into policing has led to the scientification of policing—where the trappings and practices of the scientific method are routinely used in policing practice. For example, crime and intelligence analysts run algorithms that "can identify who the key people are within an organized structure, and from that it can help narrow the focus to the main targets of an investigation far quicker than through traditional techniques" (Bjornson 2013:1). The subjective interpretive work performed by police as they fill out routine paperwork is made "objective" through algorithmic processing and statistical analysis. The scientification of policing has created a veil of objectivity because it is argued that "the computer eliminates the bias that people have" (Friend 2013:1). Thus, technological data *legitimizes* the identification of social problems, as well as the deployment of resources and the management of the problem. A crime analyst explains:

> I've now *taken the subjectivity* out of it … I can now identify these hotspots … with certain confidence, *statistically speaking*. So I can now say that there is something going on there. So the risks … are greater in these areas than in the areas that are cold. (21, Crime Analyst, *emphasis added*)

Big data is perceived as leading to accountable, informed, and objective decision-making (Bennett

Moses and Chan 2014). The intelligence report "gives us our analytical evidence, *our grounds to be working* in the neighborhood where we need to be" (23, Police Chief, *emphasis added*). They provide a means for police to engage in *technologically augmented social problems work* by identifying social problems. Crime analysts working in conjunction with their diagnostic technologies construct analytic outputs that are used to guide police practices. For example, where do officers need to be deployed? What evidence justifies their new deployment patterns and interventions? Access to big data removes the temporal aspect of traditional policing, allowing police to legitimize their actions on the basis of stored records of past events (see also Sanders and Hannem 2013).

While diagnostic technologies legitimize the social problems work police do, this also aids in *constructing* crime problems. Access to big data promises abilities that were never before possible with "traditional" policing methods. For example,

> crime mapping *turns data into visible stories* so that the police force can proactively recognize problem areas and swiftly develop crime fighting strategies … Crime mapping equips crime fighters with geographic literacy by turning a wealth of police records into meaningful visuals. (ESRI Canada Limited 2010:2)

Geographic information systems (GIS) function to increase the legibility of municipal space, allowing police agencies to allocate officers and resources in a way that is deemed most efficient and accountable. As the following excerpt highlights, GIS are taken to be or defined as a "strategic and tactical tool for law enforcement" (20, GIS specialist), assisting with crime prevention:

> data is updated on the GIS server every 24 hours to enable analysis and visualization of spatial patterns and connections of crime. Part of our *strategic business plan* is to provide consistent and equitable deployment of police resources while optimizing the effectiveness and efficiency of community contact with police service. (2011, ALEP Annual Meeting, *emphasis added*)

Thus, police believe the use of GIS has rendered the municipal landscape increasingly legible and has allowed a reconfiguration of how police organizations make sense of public space.

Access to big data and computational tools provides police services with visual data that requires interpretation. For example, many police services provide their officers with access to technologies to do their own crime analysis. The following excerpt from a police chief explains how an officer who has been off work for a week can, upon her return, use the technology to visually identify crime problems in her area.

> They should be able to bring up a map on the mobile work station, click the category, "tell me about Break and Enters, tell me about my robberies, tell me about my assaults" … they should be able to see it. And then they see the common areas, and then they know where to go. (23, Police Chief)

By employing institutional rules and categories, the officer believes s/he is capable of collating and analyzing data in meaningful ways that s/he can interpret and address. "Using GIS, you can create a map that can *identify* where the crimes are occurring and *clarify* what crimes are or are not related based on your research. This can allow investigators to target their efforts and line officers to patrol and respond to locations while being more fully aware" (ESRI 2008:5, *emphasis added*). Through this process, we see how crime problems are constructed by police officers.

The use of big data for constructing facts about crimes is not restricted to identifying problematic areas. As the following analyst, working on a single case, explains:

> I was … just working in the wire room and analyzing phone records … one of them was a half million cell phone records on a project and being able to crunch that down and look at uncovering new people of interest … based on this [analysis] here are a dozen other people that have come out of the phone records and here is why they look [like] they could be of interest or could be relevant so we should go … investigate these and then from there … we end up following even more and interviewing more people and finding more victims. (30, Intelligence Analyst)

Without access to big data, the identification and justification of the social problem would not have been possible. For example, during a homicide investigation, an intelligence analyst conducted a nationwide analysis and identified a suspect who had "virtually been an unknown until we started looking at these homicides collectively and seeing how he came in … He was completely off the radar …and he's responsible for nine homicides across the country and internationally" (33, Intelligence Analyst). Through the use of diagnostic technologies, the interpretive work conducted by crime analysts is rendered invisible and the analytic outputs constructed are regarded as objective and provide legitimacy to police practices.

Preventing and Predicting Future Social Problems

Beyond using diagnostic technologies to construct and legitimize problems that are presently occurring, big data is utilized by police to *predict* future problems in order to intervene and prevent impending occurrences. The predictive elements and outcomes of ILP boost the ability to forecast locations where future criminal occurrences likely will take place. Officers are directed to predicted areas with the goal of intercepting crimes before they happen. As explained earlier, police officers have the capability to conduct their own analyses or receive analytical information directly in their cruisers while on patrol,

> enabl[ing] them to self deploy to crime locations predicted for the future … The predictive capabilities of drawing upon and analyzing information contained within an agency's data warehouse promise to empower individuals with the tools they need to monitor predicted crime hotspots within their own areas of responsibility. (Allen 2013:1)

Through the use of big data, police services are capable of constructing visual images of where crime *will* occur. Diagnostic products, such as those derived from risk terrain modeling, are perceived as being superior to other ways of knowing the city landscape and human behavior.

The following example provided by an intelligence analyst on geographical profiling illustrates how the information acquired from big data is ascribed authority and used to inform predictive practices.

> I did the geographic profiling analysis, as well as a combination of this probability grid and was able to prescribe a deployment strategy. Specific times, I said you should be in this, one of these two areas, between 10:30 and 1:30 on a Tuesday or Wednesday, over the next four weeks … they went out there on a Tuesday parked their car at 10:30, and at 11:33 … they caught the guy. (I21, Crime Analyst)

Through the adoption and utilization of big data "many agencies are employing geographic profiling to forecast an offender's residence or next crime target based on history and patterns" (ESRI 2007:2). The predictive capabilities of big data have been taken so far that the LAPD's captain, Sean Malinowski, "envisions a time when the police will issue crime forecasts the same way the National Weather Service issues storm alerts" (PredPol 2013). Thus, the use of big data for predicting future crime problems further reinforces the notion of big data as an objective means for decision-making. When police services make strategic and tactical decisions, such as reallocating police cruisers to areas "predicted to be problem locations," they ascribe authority and legitimacy to big data and construct it as an active agent within social problems work. Interestingly, using active rhetoric in their claims-making places increased importance on the function of these technologies, which in turn legitimizes the need for such technologies.

The Mangle of Social Problems Work: The Intermingling of Police and Technologies

The advent of science and technology in policing practices has led to organizational changes. As police services turn to "technology to tackle antisocial behavior and vehicle crime and extend its use across the capital" (Infante 2013:1), they acquire legitimacy by making invisible the subjective and interpretive aspects of policing. Although the intelligence products *are* a constructed artifact, the subjective and human elements of its construction become black-boxed and taken for granted. As a result of this black-boxing of human agency and interpretive practices, the outputs created are perceived as cutting edge, *authoritative* knowledge, devoid of subjectivity.

Crime classifications *are* human constructs that arise through the interpretive work of police officers in *conjunction* with their technology. The technological standardization of police reporting and analysis constructs makes invisible the sociotechnical labor, while simultaneously providing objectivity and authority to the outputs. Through the use of big data, police personnel are provided with "meaningful information." However, the technologies do not, in and of themselves, provide *interpretations* or *actionable* data. Instead, social problems work is accomplished through the negotiated labor of police personnel with their diagnostic technologies. As a crime analyst explains:

> *[we] need the analysis* to get further explanations as to perhaps, "Oh, why is that happening?" And, when is that happening? What's the breakdown of things that are happening there? Is it seasonal? Is it cyclical? Does it follow a pattern? Does it follow a spatial pattern? (21, Crime Analyst, *emphasis added*)

Thus, the data is only made meaningful and actionable through the interpretive and analytic processes of people—analysts and police officers. The following example illuminates the interplay between intelligence analysts and big data for conducting social problems work. An intelligence analyst, working sex crimes, designed and created a sex crime modus operandi (MO) template to enable her to filter searches based on types of sexual assaults (stranger, acquaintance, etc.) and MO (intercourse, groping, oral, kissing, alcohol or drugs involved, sex trade worker, etc.). She created these classifications based on institutional rules of policing.

> Using the sex crime MO template … she started linking 20 cases that were never connected that were related ... And she started drawing all these causal linkages, and then she drilled it down and she goes [to a police service outside of her jurisdiction and said] … you've got a serial sex offender/violent offender on the loose ... So they put a project together … put surveillance, and they caught him in the act taking a girl down. And he was like mid-strike with a tire lock … when they went break down, shake down and took him out. And he was charged with 17 previous offenses. (39, Intelligence Analyst)

Through the application of criminal classifications, codes, and categories to big data, the intelligence analyst identified a previously unknown serial rapist. Through her use of big data the police were "able to articulate that … for their warrants" in order to make an arrest (I30, Intelligence Analyst). The data the analyst provided the police legitimated their decision-making by giving them cause to take action. Thus, it is this very mangle of social problems work—with police in conjunction with their technologies—that shapes the construction, interpretation, and understanding of crime problems and the social problems work conducted by police.

Conclusion

Technology has a significant effect on human actions, interpretations, and understandings. The human actor and the non-human technology are co-constituted, and as such, one does not make sense without attending to the other. Here, we illustrated how social problems work was accomplished through the interplay of police personnel with materiality, specifically, diagnostic technologies. Through a case study of ILP, we have demonstrated the importance of context for understanding how one engages in social problems work. Drawing on qualitative studies in science and technology, we argue that more analytical attention needs to be placed on the *structural contexts* and *material realities* that influence, shape, constrain, and guide the mangle of social problems work.

We argue that social constructionists' analyses of social problems work must be more centrally attentive to the impact of context. Language and meaning-making, we argue, does not exist independent of its context but is instead a reflection of the cultures and social structures in which it

exists. We have attempted to more clearly conceptualize context by drawing on Holstein and Gubrium's (2003) notion that context is actively constructed, but expanding it by noting that it is interactively constructed by actors *through their interactions with technology* (Holstein and Gubrium 2003). Thus, at the heart of this paper, we are calling for a *programmatic change* to the study of social problems work. Specifically, we argue that materiality is integral to the construction of social problems and therefore should be incorporated into the perspective in the same way other central concepts, such as framing and cultural feeling rules, are attended to.

Our analysis of ILP has demonstrated how social problems work is accomplished through the interplay of meaning making processes, institutional rules, and technologies. Social problems are affirmed, constructed, and predicted based on the collation and analysis of numerous subjective categorizations completed and technologically standardized by police. Thus, to understand and make sense of police services' engagement in social problems work we must be attentive to its co-constituted make up. Police officers' interactions with people on the ground and the meanings they attach to those interactions become encoded, based on organizational rules, into documents that are later collated and analyzed. The use of technologies for *constructing* crime problems and *proscribing* lines of action provides police with *legitimacy* because technologies occupy "a privileged space in the cultural production of objectivity and truth" (Joyce 2005:457).

As illustrated in the case study, the use of big data by intelligence analysts for doing social problems work provides objectivity and legitimacy to a process that, at its foundation, is subjective. As many science and technology theorists have identified, objectivity is "tied to a relentless search to replace individual volition and discretion in depiction by the invariable routines of mechanical reproduction" (Daston and Galison 1992:98). Technologies, such as classification systems, are powerful tools in social problems work as they become viewed as self sufficient or "black boxes" that remove the human labor involved in their development, maintenance, and application (Latour 1987). However, black boxes contain multiple memberships, negotiations, and complexities, but these activities are rendered invisible by the acceptance that "no one is going to dispute a black box" (Latour 1987:29). Thus, *facts* produced by machines, such as those used by police for constructing and targeting social problems, "provide neutrality in the production of knowledge … [and] have remarkable status, and operate as signifiers of authoritative knowledge" (Joyce 2005:457). It is this legitimacy afforded to technologies that exemplifies the important role they play in social problems work and necessitates the need for closer examination.

Conceiving of technologies as powerful tools that incorporate heterogeneous groups, interests, and activities provides social problems researchers with an ability to provide critical insight into the prejudices, desires, and inequalities of the designers and users that are enmeshed with the technologies they develop (see: Star 1995; Sanders 2014). Thus, by placing analytical attention on the "mangle of social problems work," we believe that social constructionists can provide critical insight into processes underlying the reproduction of inequality.

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