Becoming Crime Analysis: Towards the Development of an Analytical Identity as a Mechanism for Progress

by

Amanda Schenk
Bachelor of Arts, The University of Tulsa, 2013

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Name: **Amanda Schenk**
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Examining Committee

Dr. Amanda McCormick
GPC Chair
Director, School of Criminology and Criminal Justice

_____

Dr. Irwin Cohen
Senior Supervisor
Associate Professor, School of Criminology and Criminal Justice

_____

Magda Marczak
External Examiner
Manager i/c Crime Analysis Section Investigative Services
Surrey RCMP

_____

Date Defended/Approved: April 25, 2019

Abstract

Crime analysis has been widely adopted and accepted within law enforcement on the promise that it has the potential to increase efficiency and effectiveness. Despite its proliferation, a growing body of literature suggests that crime analysis both falls short of affecting law enforcement operations and also may, through its methods, reinforce rather than challenge traditional policing structures and approaches. This major paper explores the origins of crime analysis as a means of explanation for this shortcoming, identifying that the function of crime analysis has been constructed and defined by law enforcement. Law enforcement's perception of analysts as information collators and disseminators stemmed from an increased need for access to information in the modern policing era and has contributed to a lack of clarity around the definitions, role, and purpose of analysis in the law enforcement context. Hypothesizing that crime analysis reinforces traditional policing as is itself the by-product of traditional policing, this major paper provides recommendations for progress by proposing the development and maintenance of an analytical identity, where crime analysis *works for* rather than is *defined by* law enforcement. Through comparison with the discipline of data analysis, recommendations for the role and process of analysis within law enforcement are proposed, and hiring, training, and management are discussed as central to the continued professionalization of analysis within law enforcement. Ultimately, this work seeks to contribute to criminal justice by providing context for a growing body of research identifying challenges with crime analysis and developing recommendations for progress.

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Dedication

"Make a careful exploration of who you are and the work you have been given, and then sink yourself into that. Don't be impressed with yourself. Don't compare yourself with others. Each of you must take responsibility for doing the creative best you can with your own life." – Galations 6:4-5

This paper is dedicated to my family – my parents, my sister, and my brother – all of whom have exemplified the above and explicitly and implicitly encouraged me to do the same.

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Chapter 1: Introduction

At face value, crime analysis appears to have fallen short of its perceived potential. While frequently touted as having great promise for law enforcement progress and reform, extant literature has documented the limitations of crime analysis in fundamentally affecting law enforcement function (Boba Santos & Taylor, 2014). This major paper begins with an overview of the literature on the function of crime analysis as a profession, focusing on research that indicates that, in addition to failing to achieve its reformative potential, crime analysis may actually be reinforcing traditional approaches to policing (Sanders & Condon, 2017) that are reactive in nature and whose core principles, including random patrol and rapid response, have been shown through research to be ineffective at reducing crime or improving public safety (Weisburd & Eck, 2004).

To date, discussions for potential solutions to the documented limitations and ineffectiveness of crime analysis have been focused on improving the skills of analysts. However, evaluation of the development of the discipline of crime analysis suggests the challenges within crime analysis may be more fundamental. This major paper explores the ways law enforcement has constructed the function of crime analysis and the extent to which analysts have adopted this function as their own, suggesting that this has resulted in a lack of analytical identity that contributes to the challenges experienced by the discipline in achieving its potential.

To develop this understanding, this major paper presents an overview of the evolution of modern policing, identifying that the initial movement toward the professionalization of policing placed increased emphasis on the use of information and knowledge. While the forefathers of modern policing are understandably cited within crime analysis literature as the instigators for the discipline, this major paper evaluates the historical material on the role and function of crime

analysis to identify that, at the outset of modern policing, crime analysts were seen as information collators and information providers, rather than as a specialized role responsible for generating insights from data for law enforcement. The shift in focus from traditional to data-informed policing approaches emphasized and institutionalized the role of crime analysis in law enforcement, but, as the discipline evolved from traditional policing priorities, these shifts entrenched the role of the analyst without enhancing or fundamentally changing its capacity to contribute to law enforcement.

Building upon the way law enforcement constructed the role of crime analysis out of its own perceived needs, this major paper provides evidence for the fact that crime analysis has adopted law enforcement's construction of the profession as its own. To establish this point, this major paper evaluates current sources on crime analysis, noting the prevalence of role and process confusion, where the use of tools, methods, and creation of specific products are equated with doing crime analysis. It is ultimately suggested that crime analysis' tendency to reinforce, rather than challenge, traditional methods of policing is not simply the result of a lack of training or skills, but the failure to develop a fulsome analytical identity in the absence of a clear understanding of the role or process of an analyst. Accordingly, solutions to the limitations of crime analysis must be directed at developing a cohesive analytical identity, rather than method or tool-specific training approaches. As available research is focused on analyst training as a means for overcoming shortfalls within the discipline, this major paper adds nuance to these suggestions for progress by identifying that a more fundamental development of analytical identity may be needed.

This major paper subsequently takes a step toward an initial conceptualization of an analytical identity for crime by drawing on principles from data analysis. The field of data

analysis is believed to offer much potential from which crime analysis can learn as the field has begun a conversation around identity and analysis frameworks (Grolemund & Wickham, 2014; Hicks & Peng, 2019). This major paper suggests that, rather than emphasizing specifics tools or methods, crime analysts could be better understood as data analysts who apply analytical methods to the problems and questions of law enforcement. This major paper makes recommendations for a renewed understanding of the role and process of crime analysis, as well as considerations regarding hiring, training, and management as methods for maintaining this identity. Finally, key limitations and barriers to the success of crime analysis are identified, including law enforcement's original need for access to information and the absence of a data culture within law enforcement, and considerations for progress in this regard are suggested.

The objective of this major paper is to further the work of law enforcement crime analysts through developing an understanding of the perceived root causes for the limitations of the discipline. In doing so, this major paper can make an important contribution to the literature on crime analysis by contextualizing the origins of the discipline and the way that it has contributed to the present crime analysis function. While a body of literature exists documenting the way in which law enforcement has constructed the use of technology and the use of information and data-driven strategies within the framework of law enforcement (Manning, 2001; Weisburd, Mastrofski, McNally, & Greenspan, 2002), no research has evaluated the way law enforcement has constructed the work of analysts who make use of both information and technology as part of their job function.

Another key contribution of this major paper to the fields of crime analysis, law enforcement, and criminal justice is the argument that analysts in the law enforcement context would benefit from developing a sense of analytical identity and a renewed understanding of the

role of the analyst. It is uncontested that crime analysis has the potential to significantly and positively affect the function of law enforcement agencies, but it is suggested that, in order to do so, the field must develop an analytical identity and an understanding of the analytical function independent of law enforcement's construction of the role. In this way, the analyst is repositioned from a supporting role to that of an analytical specialist, one whose skills are applied to the law enforcement context. This major paper proposes an initial conceptualization for this analytical identity in the context of crime analysis, and, in doing so, seeks to contribute to the furtherance of the discipline.

Chapter 2: State of Crime Analysis

As will be explored, a lack of clarity and significant inconsistency exists around the definition and function of crime analysis (IACA, 2014). Despite this, some general themes and tenants are common across existing definitions, and it is generally accepted that crime analysts are individuals who work with information and data for the benefit of law enforcement (Boba Santos, 2017). Ideals commonly associated with crime analysis include cost-effectiveness and efficiency, where limited resources can be deployed at targeted issues in order to mitigate risks (Belur & Johnston, 2018; Maguire, 2000; Ratcliffe, 2002), and the potential for analysts to inform law enforcement strategies by bridging the gap between evidence-based research and law enforcement (Boba Santos, 2014; Keay & Kirby, 2017). Crime analysis is believed to play a key role in crime reduction (Boba Santos, 2014; Cohen, Plecas, McCormick, & Peters, 2014), and is seen as central to the implementation of effective and efficient policing strategies (Santos, 2017).

Apparent from its prevalence in law enforcement agencies, crime analysis has developed into an established discipline and core component of present-day policing. The presence of crime

analysis within North American law enforcement was solidified with the creation of the 1968 Omnibus Crime Control and Safe Streets Act in the United States (Gottlieb, Arenberg, & Singh, 1994; Boba Santos, 2017). An extensive annotated bibliography of publications related to crime analysis from the late 1970s suggests that, as of the 1970s, published materials related to the use, development, and promotion of formalized crime analysis function proliferated (Emig, Heck, & Kravitz, 1980). The discipline of crime analysis was formalized with the introduction of the International Association of Crime Analysts (IACA) in 1990. Still active today, IACA offers formal certification for working crime analysts and training on a variety of related topics.

A variety of key factors contributed to the growth of crime analysis, including the National Intelligence Model, implemented in the United Kingdom in the early 2000s (Keay & Kirby, 2017), and the intelligence-led policing movement (Sanders & Condon, 2017). Each was intended as business and operational strategies designed to maximize law enforcement efficiency (National Centre for Policing Excellence, 2005; Ratcliffe, 2016) and emphasized the use of analysis as a means of doing so. As a result of these movements, the prevalence of crime analysis increased substantially. A United States (U.S.) Department of Justice study (2002) found that, of 554 police departments with more than 100 police officers, 74% had at least one person whose primary function was crime analysis. These findings were echoed by a 2003 study that also found that there was an average of nearly one analyst per 100 police officers in the United States (O'Shea & Nicholls, 2003). More than just recommended, crime analysis functions have also been mandated as a requirement for law enforcement agencies in some parts of Canada (*Police Services Act*, 1990). The degree to which crime analysis is established as a discipline is also reflected in the availability of related research. For example, there is a growing body of research regarding the methods and tools in crime analysis, and recent trends in research include

ethnographic studies on the discipline of crime analysis and its analysts (Sanders & Condon, 2017; Weston, 2015).

This literature and data demonstrate the widespread acceptance and adoption of crime analysis as a component of law enforcement. These positions and units have been created at great frequency and significant investment on the promise of modernizing law enforcement operations. Despite the perceived potential of crime analysis as a mechanism for progress in law enforcement operations; however, crime analysis' failure to have a noteworthy influence on law enforcement operations to date are well documented, and research has indicated crime analysis is weakly incorporated within policing work (Boba Santos & Taylor, 2014). Commonly identified and cited external constraints on the effect of crime analysis work include law enforcement's continued focus on reactive policing (Belur & Johnson, 2018; Cope, 2004; Taylor, Kowalyk, & Boba, 2007), traditional resistance to innovation (Cope, 2004; Taylor, Kowalyk, & Boba, 2008), a lack of organizational clarity around how to task crime analysts and utilize analysis products (Belur & Johnson, 2018; Boba Santos & Taylor, 2014; O'Shea & Nicholls, 2003; Taylor, Kowalyk, & Boba, 2007), and issues with data quality (Cope, 2004; Santos, 2012), among others.

Of note, there is a growing body of research that indicates that, rather than simply failing to challenge and inform the standard model of policing, crime analysis may actually be reinforcing these approaches. The traditional or standard model of policing, which developed with the evolution of modern policing in the 20th century, is focused on random patrol, reactive rapid response, intensive enforcement, generalized investigations, and increasing the size of the police department as mechanisms for preventing crime and disorder (Weisburd & Eck, 2004). Research has since identified that many of these core principles of traditional policing are

ineffective, concluding that "there is little evidence to suggest that this standard model of policing will lead to communities that feel and are safer" (Weisburd & Eck, 2004, p. 60). The use of evidence-based and data-driven strategies, with accompanying crime analysis, has been suggested as an approach for increasing policing effectiveness, where law enforcement can more effectively utilize resources to combat crime and increase public safety (Cohen, Plecas, McCormick, & Peters, 2014; Ratcliffe, 2016). Despite this promise, research has revealed the tendency of crime analysis to perpetuate, rather than challenge, this standard model (Sanders & Condon, 2017). Specifically, the fact that law enforcement appears to have adopted the work of crime analysis in theory, but not in practice, has resulted in an increase in analytical rhetoric and discourse without fundamentally affecting institutional function (Sanders & Condon, 2017; Weston, 2015).

One such example is seen in crime analysis' focus on prolific offenders. This emphasis stems from the criminological concept that a small number of offenders are responsible for the majority of criminal occurrences (Home Office, 2001). Rather than informing the identification of targets; however, crime analysts may be engaging in the tracking and documentation of activities of pre-selected targets (Innes, Fielding, & Cope, 2005). Instead of informing target selection, analysts are being employed to monitor criminal activity, custody release dates, and other information beneficial for targeting offenders (Weston, 2015). In this way, information disseminated by analysts is "employed to aid in the 'hunting' of usual suspects" (Weston, 2015, p. 118), providing insight into how it is that crime analysis may reinforce traditional approaches to policing. The selection of known offenders for targeting "is not a practice that is *triggered* by crime analysis, but is rather a routine patrolling practice that becomes *enhanced* by information from the crime analyst" (Weston, 2015, p. 120). When the practice of target tracking is accepted

within law enforcement as an analytical function, it contributes to the rhetoric that law enforcement is using and doing crime analysis while still enabling law enforcement to utilize traditional approaches to the identification of targets for proactive police work.

Crime mapping is another area where research has identified that crime analysis may be enabling traditional policing practices. The development of environmental criminology in the late 1970s and early 1980s contributed to an increased focus on the spatial understanding and targeting of crime (Brantingham & Brantingham, 1999). Crime mapping is now widely accepted as a central component of crime analysis (Boba Santos, 2017; Ratcliffe, 2004), with a significant body of research dedicated to the potential of hot spot policing and other forms of spatial data analysis in effectively deploying resources to address crime (Braga, 2006; Eck, Chainey, Cameron, Leitner, & Wilson, 2005). However, the production of crime maps by crime analysts have been noted to be primarily visual representations of data or "tactical representations of distributions" (Manning, 2001, p. 94), rather than the product of analytical processes. These crime maps, then, are more akin to a "history report", achieving little more than adding a spatial component to the visualization of crime data (Weston, 2015, p. 31). As the impactful nature of cartographic and other visualization products lend themselves to a sense of objectivity (Heiden, 2018; Manning, 2001), there is risk in the production of visualizations without sufficient analysis. This risk, which extends beyond simply cartographic products to analytical products generally, is two-fold; the potential for the inferential and analytical work to be completed by the end-user, and the potential for the end-user to understand that product as the product of analysis. As simply representations of data, these maps lack actionable meaning and subsequently fail to effectively diagnose a problem or make solutions apparent. The absence of analysis allows

products to be interpreted within existing frames of understanding that contribute to the ways in which crime analysis may reinforce, rather than challenge, traditional methods of policing.

Furthermore, research has revealed that the tendency for analytical products to be descriptive in nature extends beyond crime mapping; analytical reports have also been noted to be the product of collation and synthesis without analytical value (Sanders & Condon, 2017). Rather than being a product of analytical processes, "the manufacture of intelligence routinely involved piecing together information from a range of disparate sources", amounting to little more than information dissemination (Innes, Fielding, & Cope, 2005, p. 51). The practice of analysis, which adds a degree of interpretation and the communication of findings, rather than simply observations, is a process that builds understanding (Grolemund & Wickham, 2014). It is through analysis and the generation of insight and new knowledge that crime analysis can achieve the potential offered by the literature. Without this process, the products produced by analysts do little more than aggregate disparate information; a process that has more in common with operational reporting than analysis. Operational reporting, a concept borrowed from business analysis, is valuable in understanding what is occurring in an organization on a daily basis but differs from analysis in that it does not seek to provide explanations for an observed phenomenon (Wilson, 2007). Through adopting the operational reporting of crime as analysis, both crime analysts and law enforcement demonstrate a lack of understanding of the process and role of analysis. In effect, by producing products without conducting analysis, crime analysts enable the "reappropriation of analysis" (Sanders & Condon, 2017, p. 246), where the ideals of analysis are adopted in concept while failing to affect traditional policing approaches.

These practices have contributed to the finding that law enforcement agencies may use intelligence-led policing as an organizational concept without fundamentally changing the nature

of law enforcement operations (Weston, 2015). In fact, rather than shaping law enforcement, the very work and function of crime analysis have resulted in a discipline that has "changed the symbolic nature of policing while reaffirming traditional ways of knowing and policing" (Sanders & Condon, 2017, p. 249). Through the creation of products that are primarily descriptive, rather than the product of analytical inference or deduction, crime analysis may be enabling rhetoric of objectivity and rationality while maintaining and even reinforcing law enforcement status quo. Assessed collectively, the contributions of this body of research support that, despite the promise of crime analysis as a tool to achieve reform and change within law enforcement, at best, the field of crime analysis appears to thus far have failed to achieve its potential and, at worst, may enable traditional methods of policing.

Chapter 3: Development of the Discipline

While the body of research linking the shortcomings of crime analysis to the reinforcement of police culture is relatively new, the fact that the discipline of crime analysis is underdeveloped is well documented (Belur & Johnston, 2018). The research literature has focused on the need to improve analytical capabilities, proposed better training in tools and methods, as well as the promise of partnerships with academia as mechanisms by which crime analysis can improve its outcomes (Braga, 2016; Drawve, Belongie, & Steinman, 2017; Sanders & Condon, 2017). The section below seeks to contextualize the shortcomings of crime analysis through an exploration of the evolution of policing, its emphasis on information and knowledge, and the ways this has shaped law enforcement's perception of the function of crime analysis. This is followed by an assessment of the available information from within the discipline, contributing to an understanding of how it is that crime analysis identify and comprehend its

role. This additional context facilitates a more fulsome understanding of how it is that crime analysis may reinforce traditional policing values and lays the groundwork for new approaches to progressing as a discipline.

Part One: The Evolution of Modern Policing and Development of Crime Analysis

Law enforcement has frequently been conceptualized as "knowledge work" (Ericson & Haggerty, 1997; Cope, 2004). While much of policing may be reactive and action-oriented, with a focus on decision-making rather than developing understanding, police investigations rely heavily on information and knowledge as a core component of their work (Brodeur & Dupont, 2006). Investigative outcomes have been shown to depend significantly on information and knowledge availability (Gottschalk, 2006), and information from witnesses and involved parties has been established as central to resolving crime (Wellford & Cronin, 1999). In an era with increased technological "information", the availability of this information has also been established as relevant to investigative success. For example, a British Columbia study established the importance of videos surveillance in the resolution of homicide investigations (Weidman, 2017), and other research has identified the importance of computerized databases in homicide investigations (Braga & Dusseault, 2018).

More than simply consumers of information, police investigations also generate significant quantities of information. The process of police investigation has been identified as "information rich and knowledge-intensive" (Gottschalk & Dean, 2010, p. 94). In fact, policing has placed such a focus on the use of information that it has been suggested that law enforcement now store information generated as the by-product of police work with no distinct purpose or intention for its use (Manning, 2001). The failure of police to effectively manage and use

available data has resulted in the introduction of the major case management model for handling large-scale investigations. High profile incidents and their corresponding inquiries, including the Campbell Report into the investigation of Paul Bernardo and the report prepared by the Missing Women Commission of Inquiry following the case of serial killer Robert Pickton, contributed to the development of knowledge management systems in an attempt to avoid systemic failures resulting from data silos and inaccessible information (Public Safety Canada, 2015). The proliferation of data in present-day policing is apparent, and even reactive policing approaches demand information and knowledge (Brodeur & Dupont, 2006; Manning, 1988), where police officers are "experts" and "key knowledge brokers" (Cope, 2004; Ericson, 1994). Law enforcement spend a substantial amount of time gathering and collating information into reports (Ericson, 1981) and disseminating this information to key stakeholders in the criminal justice system, including the courts (de Lint, 2003; Ericson, 1994).

While this connection between law enforcement function and the need for information and knowledge is evident in present-day policing approaches, the origins for the use of information for investigations and other purposes stemmed from the modern policing movement. Characterized by the work of Sir Robert Peel, modern policing emphasized the professionalization of policing, distinguishing itself from the shortfalls of historical methods of policing (Drew, 2015). Previous forms of policing tended to be localized and focused on the protection of individuals, with the unequal distribution of wealth between urban and rural areas leaving the policing function ripe for corruption (Rawlings, 2008). By contrast, Peel's principles proposed a new professional police force whose function was no longer simply to respond to crimes, but also to maintain order (Drew, 2015). This professional model formed the beginnings

of a shift from reactive policing to increased police responsibility for the proactive maintenance of law and order.

It is this movement toward a professional model of policing that contributed to and has resulted in "an ecology of information gathering" within the law enforcement context (Manning, 2001, p. 86). An early indicator of this trend toward the use of information is visible in the restructuring of the London Metropolitan Police. Widely considered the home of modern policing, the Metropolitan Police created a detective bureau in 1842 responsible for identifying patterns in crime for the purpose of solving crime (Boba Santos, 2017). In addition to using information to identify and resolve criminal offences, the Metropolitan Police aggregated data to understand their own operations. A timeline of the history of this police force indicates data on crime counts and disposition were available as early as 1847 (Boba Santos, 2017). More than just for investigative work, modern policing evolved to using information and producing knowledge for its own internal management (Ericson & Haggerty, 1997). A variety of new policing models and strategies resulted from policing's reform efforts, including the introduction of the patrolman and deployment strategies (Wilson, 2000).

Modern policing made its way to North America in the mid-20th century, where police reformers August Vollmer, O.W. Wilson, Bruce Smith, Harry Fosdick, V.O. Leonard, and others played a significant role in police use of information through a movement to enhance police administration (Wilson, 2000). Vollmer introduced a modus operandi classification system and recommended the application of preliminary methods for understanding crime, including mapping crime to identify areas of crime concentration (Wilson, 2000; Grassie, 1977). O.W. Wilson subsequently recommended patrol deployment in accordance with crime patterns (Wilson, 2000). The call for modernization of policing resulted in an increased reliance on

information to guide policing function, and these reformers played a central role in emphasizing the use of information as central to the policing function. Reference to the use of data and information, and recommendations for the use of analysis can be found as early as the 1950s where police departments, such as the New York City Police Department and Chicago Police Department, recommended the analysis of data to reveal crime and offender patterns (International Association of Crime Analysts, 2017).

Understandably, the literature on crime analysis has equated this movement toward the use of information as the impetus for the development of crime analysis, pointing to police reformers as the forefathers and instigators for the discipline (Boba Santos, 2014; Gottlieb, Arenberg, & Singh, 1994). One of the first known references to formal crime analysis is from 1963 in the second edition of reformer O. W. Wilson's *Police Administration* (Boba Santos, 2017; Gottlieb, Arenberg, & Singh, 1994; Chang, 1979), and Wilson's popular book, recommended for use by police leaders of the day, is credited with the institutionalizing of crime analysis as an essential function (Boba Santos, 2017; Gottlieb, Arenberg, & Singh, 1994).

Evaluation of early literature on crime analysis; however, reveals that the analytical function was, at times, conflated with operational reporting with a focus on the collation, relating, description, and dissemination of aggregated information, rather than the generation of insight from accumulated data. The promise of the crime analysis in the information era was great, but the focus was on the role of crime analysis in making "the individual line officer more informationally aware and thus more effective" (U.S. Department of Justice, 1973, p. xv). Further, in the *Crime Analysis Systems Manual*, the purpose of crime analysis is described as "to provide timely and pertinent information about crime patterns and trends" (Grassie, Macsas, & Wallace, 1977, p. 7), and a 1976 evaluation of a Crime Analysis Unit with the Omaha Police

Division indicated that the goals of the unit were to provide managers with information to allow for efforts to be focused on locations and times with the greatest need to increase public safety and reduce crime (Daake, 1976). This literature provides insight into early conceptualizations of crime analysis, where the focus was on the provision of information to allow law enforcement to interpret and reach their own conclusions from the aggregated information, rather than the generation of insight to enable law enforcement to make better decisions based on conclusions generated through the analysis process.

The *Police Crime Analysis Handbook*, authored for the United States Department of Justice in 1973, advised that the identification of targets was fundamental to the work of crime analysis, and specifically, "the process of establishing, screening, and ordering lists of suspects for individual crimes" (p. 1). While analytical methods can contribute to target identification and prioritization, the identification of suspects responsible for individual crimes is more akin to investigative work through data review than the product of analysis. Confusion about methods of analysis was rampant, where the necessity of manually examining police reports was a core component of Wilson's definition for the work of analysts (Wilson, 1963). In dictating the specific actions undertaken by crime analysts, rather than focusing on the types of questions or problems that analysts could assist with, this early literature revealed an emphasis on the use of analysts for sifting through information and a lack of awareness of the utility of an analyst.

The belief that crime analysis was simply the formal manifestation of work already being done by police officers provides further evidence of the conflation of analysis with the collation and relating, or linking, of information. This thought is prevalent in the early literature on crime analysis: "Police officers have long analyzed crime informally. An alert patrol officer, plagued by a rash of auto thefts in a particular section, may know from experience that such thefts are

often committed by youngsters. Aware of a new teenage 'hangout' near the theft sites and determining that its closing hours corresponds to the time of the thefts, he can then alter his tactics to cope with the problem" (U.S. Department of Justice, 1973, p. xi). Further, "Informal crime analysis… is performed by all officers as they investigate crimes. Crime analysis is the quality of examining one crime occurrence and comparing it with past events." (U.S. Department of Justice, 1973, p. 3). In fact, the initial crime analysts were law enforcement officers (O'Shea & Nicholls, 2003). While the information described above may be valuable in a specific instance, it is less the result of analysis than it is an inference from personal experience, and the failure to distinguish crime analysis from this process is indicative of a lack of clarity around the work or potential of analysts.

The argument that crime analysis was a subset of existing police functions led some to suggest that it did not require a specific role (O'Shea & Nicholls, 2003). This is exemplified in Maguire and John (1995)'s note that, "Many police do not recognize the need for an analytical researcher in the post but see the job as retaining many of the virtues of the traditional collator's role" (p. 19). Taken collectively, these quotes reflect an understanding of analysis as the collating and relating of data, rather than the application of methods to facilitate the generation of insight from that data. Crime analysis was not perceived as a fundamentally new approach for informing police work requiring its own set of skills, but the dedication of specific personnel to this work as a result of the increased perceived relevance and the proliferation of data in the professional policing era.

Given this, the initial conceptualization of the crime analyst was not based on the development of insight to aid decision-making but to facilitate the process of information collation and dissemination, where analysis products were equated with descriptive operational

reporting. Understanding crime analysis as the byproduct of policing's unchanged platform of strategies and tactics assists in contextualizing the observations that current crime analysis practices reinforce, rather than inform, the standard model of policing. Much as Ratcliffe (2002) noted that the focus on computerization of law enforcement records came about because of the need for data summaries, the role of the crime analyst was the byproduct of the same need, pursued as a means of achieving outcomes within existing frameworks and priorities, rather than in pursuit of new understanding. The effect of this realization was reflected in the literature, where it was noted that law enforcement's traditional focus on measurement and information influenced the perception of data analysis, reducing it to counting crime and describing it (O'Shea & Nicholls, 2003).

From the above discussion, it is apparent that early views of crime analysis were rooted in law enforcement's need to access their own information and utilize it within the parameters of existing and traditional policing approaches, and it is this initial conceptualization of the function of an analyst that was entrenched as policing continued to evolve. A number of subsequent policing strategies have raised the profile of analysis and rhetoric regarding analysis without contributing to a more fulsome understanding of the nature of analytical work. Since the early 1990s, policing strategies have continued to move toward data-driven approaches, including COMPSTAT, problem-oriented policing, intelligence-led policing, and evidence-based policing, all of which rely heavily on the use of data (Sanders & Condon, 2017) and have increased the relevance and prevalence of analytical positions within law enforcement. However, rather than fulfill their objectives of being new approaches to policing, evidence exists that these movements have been adopted within existing frameworks for law enforcement operation, retaining its early

understanding of the analytical function (Weisburd, Mastrofski, McNally, Greenspan, & Willis, 2003; Weston, 2015).

One of the movements that signified the new data era was the New York Police Department (NYPD)'s adoption of COMPSTAT. Introduced in the mid-1990s in response to concerns about crime rates, COMPSTAT instituted a model whereby precinct commanders were responsible for knowing and responding to crime counts. This model includes regular meetings where information on crime is presented and police officers strategize about responses to identified crime problems (Bureau of Justice Assistance, 2013). Crime analysts play a central role in the production of COMPSTAT as they are the ones primarily responsible for collecting, analyzing, and visualizing crime data used in COMPSTAT meetings (Boba Santos, 2014; Weisburd, 2003; Willis, Mastrofski, & Weisburd, 2007). In response to the perceived success within NYPD, the use of COMPSTAT models proliferated across North America (Bureau of Justice Assistance, 2013). Within five years after NYPD's adoption of the model, nearly one-third of police departments with over 100 officers had introduced a COMPSTAT program, while an additional one-quarter planned to do so (Weisburd et al., 2003). Variations of COMPSTAT exist in many police departments in British Columbia today, with semi-regular meetings attended by analysts and police managers (Coquitlam RCMP, 2018; Mangat, 2015).

Rather than seeking to understand and respond to the origins of crime problems, COMPSTAT was intended as an accountability model. It has been argued that while COMPSTAT was seen as a revolutionary method within policing, it was not so much a revolution as the formalization of existing policing principles where trends toward problem-oriented policing and data-driven decision making contributed to its widespread adoption (Weisburd et al., 2003). Despite its promise as a renewed approach and strategy, COMPSTAT's

use as a management model is more akin with traditional rank-structured and hierarchical policing than true reform, which led Weisburd et al. to conclude that COMPSTAT may have been adopted less out of a desire for innovative problem solving than a reinforcement of traditional approaches to policing; "in order to reinvigorate and preserve police organization, police managers have adopted a model of strategic problem solving (Compstat) that in theory allows police agencies to utilize innovative technologies and problem-solving techniques while empowering traditional police organizational structures" (2003, p. 450). With respect to analysis, while COMPSTAT increased emphasis on the analytical use of data, it did so within the traditional objectives of policing rather than truly seeking to be informed through insights generated from data. Information from the Bureau of Justice Assistance indicated that "crime analysis provides the information and findings that guide the meetings" (p. 21), where police officers are the ones responsible for "discuss[ing] and analyz[ing] crime problems and the strategies used to address those problems" (2013, p. 2), further cementing the definition and perception of crime analysis as the provision of information for others to evaluate.

Intelligence-led policing is another policing philosophy that placed data analysis and criminal intelligence as central to the reduction of crime and related problems (Ratcliffe, 2008; Taylor, Kowalyk, & Boba, 2007), contributing to the increased prevalence of crime analysts seen in law enforcement today. A commonly referred-to policing approach in North America today, intelligence-led policing was birthed out of the United Kingdom as the result of a focus on a business model of policing that sought to reduce crime through the analysis of available information (Ratcliffe, 2016). Again, despite its promise for the relevance of analysis to law enforcement function, evidence exists for the possibility that intelligence-led policing may be being adopted within existing law enforcement schemas, rather than fundamentally changing

them. Jerry Ratcliffe, the author of *Intelligence Led Policing* and a proponent of intelligence-led policing, noted that it may be more straightforward to adopt the rhetoric than to fundamentally change policing operations (Ratcliffe, 2002), and a review of the available research supports that this prediction has proven accurate. An ethnographic study of a police department in British Columbia found that the organizational culture had motivated the adoption of intelligence-led policing in theory, despite the organization only selectively adopting the practices (Weston, 2015). An additional ethnographic study contended that, "while the potential for [intelligence-led policing] is available, the extent to which police services engage in it… is shaped by the cultural, organizational, and operational contexts of police work" (Weston, 2015, p. 717). In effect, research has found that intelligence-led policing has been translated within the context of existing law enforcement values, where "it appears to be integrated as a business plan for *justifying and being accountable* rather than *guiding or changing* its ground-level practices" (Weston, 2015, p. 722). The intelligence-led policing movement has resulted in increased reliance on analysts (Cohen et al., 2014; Weston, 2015), but has maintained its use of analysts for the same traditional policing needs, namely information and operational reporting.

A more recent trend in law enforcement is the movement toward evidence-based policing, where the promise for the potential use of crime analysts is again renewed (Keay & Kirby, 2017). The concept of evidence-based policing arose from approaches noted in medicine (Lumsden, 2016), having been introduced to law enforcement in Lawrence Sherman's *Evidence-Based Policing, Ideas in American Policing* (1998). The crux of this approach is the adoption and implementation of strategies that have been proven effective through research and evaluation (Sherman, 2013). Largely promoted by academics observing the lack of evaluation and application of tested policing strategies, evidence-based policing is still in its infancy. While

analysis can certainly play a role in this movement (Keay & Kirby, 2017; Smith, Santos, & Santos, 2017), potential exists for this movement to go the way of data-driven strategies before it, namely adopted in concept and rhetoric without fundamentally informing policing function. Already, the proliferation of the evidence-based policing approach is visible. For example, a UK survey of individuals at five police forces found that all had some knowledge of the term (Keay & Kirby, 2017). Importantly, other research has shown that there remains a great deal of confusion around the term, as only a small proportion of officers surveyed could provide definitions consistent with the approach as defined by academia, and indicated that the effectiveness of the approach may be hampered by this lack of understanding (Telep & Somers, 2019). Evidence-based policing is newer to law enforcement and the full scope of its adoption is yet to be understood, but the initial definitional confusion suggests that the rhetoric may be utilized without a comprehensive understanding of how to implement the approach. Should this be the case, it is possible that evidence-based policing would result in similar outcomes as intelligence-led policing, where the role of the analyst has been promoted without contributing to enhancing the analytical function.

Each of these movements contributed to the increased reliance on crime analysts. However, as these approaches appear intended to preserve the policing structure, rather than inform or change them, the function of the analyst has been promoted without contributing to a deeper understanding of the role of the analyst (Weisburd et al., 2003; Weston, 2015). Law enforcement's initial conceptualization of the analyst as someone who collates and disseminates information has not changed, resulting in the widespread adoption of crime analysis without fundamentally affecting practice.

While the discussion above has focused on law enforcement's historical conceptualization of the crime analysis function as a tool for bridging information gaps and the evolution of policing that has further entrenched this understanding, evidence exists to support the notion that law enforcement continues to see analysts primarily as collators and information relators. It is suggested that the increasingly technological nature of law enforcement work has increased law enforcement's reliance on analysts as information collators, despite the fact that the development of technology has the potential to ease information analysis and dissemination (Maguire & John, 1995).

Police, along with the rest of society, now use a variety of technology in order to perform their job. Law enforcement officers carry radios, use mobile data terminals for file management, and are dispatched via a centralized call centre (Manning, 1992). Computers log police files, but also information about the transport and lodging of prisoners, the tracking of inventory, and other administrative functions. This technology has resulted in a significant increase in the availability of data as a byproduct of policing operations. In fact, Manning (2001) noted that law enforcement stores more data than they have the intent or know-how to use.

This increase in technology brings great potential for analysis as it can reduce the amount of manual data collection and collation required to process, collate, analyze, and disseminate information. Technology has contributed to the evolution of the fields of data analysis and data science over the past two decades enabling more robust data management and processing methods (Godsey, 2017). However, it also introduces the need for advanced data management skills to locate and extract the information (Weston, Bennett-Moses, & Sanders, 2019). While there was once a specialized information collator (Innes, Fielding, & Cope, 2005), the amount of data that police collect and store substantially increased the quantity of data beyond what humans

can manage. It is suggested here that the analyst now fulfills the role of a technological information collator. In its definition of the criminal intelligence program, the Royal Canadian Mounted Police (RCMP) explicitly states that criminal intelligence serves to "connects the dots" for law enforcement (RCMP, 2014). This understanding is also apparent in the origins of fusion centers. Fusion centers, intended to be analytical hubs, were born out of an emphasis on information sharing that resulted following the 9/11 terrorist attacks in the United States (Graphia Joyal, 2010). While fusion centers appear to represent progress with respect to the integration of analysis in law enforcement, their primary function has been to provide information and enable information sharing (Graphia Joyal, 2010).

Ratcliffe (2016) noted that policing has become information rich, but remains knowledge poor, where it is challenging to gain meaningful insight from copious amounts of information, and, in their study, Innes, Fielding, and Cope (2005) equated organizational memory with the human cognitive function, suggesting that law enforcement abilities to store and access information were limited. Building on this, the introduction of fusion centers can be understood as a mechanism to bridge information sharing gaps within law enforcement. However, this reliance on information-sharing has reduced the potential of analysis and again reflects the ways in which the role of a crime analyst is defined by and fits the needs of law enforcement. The increasing complexity associated with technology has furthered the need for a specialized data collator and extractor, and these skills are often attributed to crime analysts, entrenching them as data gatherers and disseminators.

Additionally, the fact that analysts work with information has contributed to the fact that analysts "traditionally have been valued for their knowledge rather than for their skills" (Sparrow, 2003, p. 5). Over time, an analyst working closely with law enforcement data or

embedded in investigations may become an information repository, retaining institutional knowledge and functioning as a cognitive repository. As law enforcement investigators may be subject to transfer between departments more frequently, and as law enforcement relies upon knowledge (Brodeur & Dupont, 2006), the analyst becomes a valued source of information. Accordingly, law enforcement has emphasized on analysts' "capacity to absorb and regurgitate data, rather than upon their ability to design and create new information products through use of creative analytical skills" (Sparrow, 2003, p. 5). In this way, law enforcement utilizes analysts within existing frameworks of what is perceived to be important, namely, as a means of obtaining information for pre-determined objectives.

These examples are consistent with the fact that crime analysts historically have been and currently are perceived as enablers of law enforcement function through the provision of information law enforcement perceives to be necessary to fulfill their job duties. It is suggested here that the rise of crime analysis in an era of increased information relevance and importance is not a coincidence. The modernization of law enforcement and increased understanding of and need for information defined the role of crime analysts. An examination of early crime analysis literature illustrates the way in which the discipline was directly influenced and shaped by the evolution of law enforcement need for information. Rather than relying on analytical skills, the shift toward law enforcement as knowledge workers redefined information workers as analysts, responsible for collating and disseminating relationships between data with law enforcement ultimately dictating the actions and processes of analytical work. This has resulted in an analyst function that has evolved spontaneously in response to what is needed by law enforcement (Cope, 2004), consistent with research observations that information has been made into police property understood within existing cultural frameworks (Ericson & Haggerty, 1997) and

technology has been superficially adopted within the values and approaches originating from the traditional policing movement (Manning, 2008). Rather than being used to inform policing priorities, information has been used to achieve objectives, and the analyst, as the information worker, has been conceptualized within law enforcement along the same lines of understanding.

Part Two: Crime Analysts' Self-Conception and Analytical Identity

While an evaluation of the history of crime analysis sheds light on the way the function of the discipline has been shaped by law enforcement, the second section of this chapter explores crime analysts' self-conception hypothesizing that law enforcement's construction of the function of the crime analysis role has resulted in the absence of an analytical identity within the profession, and that this lack of identity and self-understanding is the crux of crime analysis' inability to substantially affect the law enforcement context.

Analytical identity is used here to refer to the analyst's or discipline's understanding of the role, function, and value of the analyst. Role theory, which is focused on the function of roles or positions of roles or positions held and performed by individuals provides a mechanism with which to understand the importance of identity (Biddle, 1986). An extension of role theory, the concept of role ambiguity contends that, in the absence of role clarity, work effectiveness decreases (Hall, 2008). Role theory further suggests that a lack of role clarity can diminish performance and cause uncertainty on the part of practitioners and clients (Solomon et al., 1985). Research in the field of data science and analysis has identified that the absence of role clarity has contributed to "an inability to communicate and teach consistent topics" (Hicks & Peng, 2019, p. 2), and an ethnographic study of intelligence analysts contended that the absence of

analytical identity among intelligence analysts, where individuals are unable to cohesively articulate their role or purpose, leads to job dissatisfaction (Johnston, 2005).

A lack of clarity around the definition and role of crime analysis is evident through an examination of the literature from the discipline. Substantial efforts have been within the discipline to define crime analysis, and it is commonly accepted that it has been challenging to do so (International Association of Crime Analysts, 2014; Sanders & Condon, 2017). A recent study further indicated that analysts have challenges differentiating between crime analysis, intelligence analysis, and the other analyst subtypes common in law enforcement (Belur & Johnson, 2018).

Existing definitions have focused on a variety of defining characteristics for the profession. While some have the application of systematic processes (Emig, Heck, & Kravitz, 1980; Gottlieb, Arenberg, & Singh, 1994), others have focused on the information-providing function of crime analysis. For example, in 2003, Osborne and Wernicke suggested that, "The objective of most crime analysis is to find meaningful information in vast amounts of data and disseminate this information to officers and investigators in the field" (p. 1). In their *Fundamentals of Crime* Analysis, the International Association of Crime Analysts identified that, "crime analysts provide information to police agencies about crime" (2017, p. 1). These definitions reiterate early characteristics of crime analysis by law enforcement leaders that suggested that a primary function of crime analysis is to provide law enforcement with information about crime, rather than focusing on the generation and provision of insight as the core component of analysis. The reflection of law enforcement's needs, namely for information, in existing definitions for crime analysis suggest that the discipline has, to some degree, adopted law enforcement's conceptualization of the role of analysis.

Moreover, a discussion of the decision-making process for analysis in the available literature primarily centres around the "intelligence cycle", a model consisting of a variation of five or six steps typically including planning, data collection, collation, analysis, and dissemination. This cycle is often referred to as a core part of both crime and intelligence analysis work (International Association of Crime Analysts, 2017). Specifically, IACA noted that information "must be examined in a thoughtful process, such as the intelligence cycle" (2017, p. 261). However, this model does not provide insight into the decisions made by an analyst that enable the generation of insight or new knowledge from raw data, and substantial criticisms about the utility of this cycle as a framework for analysis are documented in the literature (Hulnick, 2006). In its discussion of the fourth step of the intelligence cycle, IACA noted that "analysis is the most critical component of the intelligence cycle as it establishes the intelligence and the analyst is able to summarize the data into a clear and concise manner" (2017, p. 262), but failed to elaborate on how this is achieved.

Rather than emphasize the process of analysis, the discipline of crime analysis appears to have equated the use of tools, application of methods, and production of products with doing crime analysis. The vast majority of literature in the discipline of crime analysis is methodological in nature, covering a variety of specific methodological techniques for crime analysis, including social network analysis, hotspot mapping, and others (Sanders & Condon, 2017; Taylor, Kowalyk, & Boba, 2007), and there is significant emphasis on the use of these methods as a focal point of crime analysis. As an example, some literature discusses crime analysis as a method in and of itself (Tran, 2015), and crime mapping has been noted to be a "type" of crime analysis (Giblin, 2006). Chang (1979) identified a few specific crime analysis functions, such as crime pattern detection, crime suspect correlations, and target profiles, among

others. While methods are essential to conducting analysis, they are an aspect of analysis, rather than the defining characteristic (Tukey, 1962).

A review of the literature produced from the discipline also reveals a substantial emphasis on specifying the types of products produced by crime analysts. One chapter in the International Association of Crime Analysts' (2017) book, *Exploring Crime Analysis*, is dedicated to analytical products, with frequent mention of reports and bulletins. Examples of specific report subtypes are provided, and a list of multi-purpose products is provided as examples of the work produced by crime analysis, including reviews of crime patterns, warrant lists, and wanted and missing person notices, among others. The National Intelligence Model, implemented in the United Kingdom, has created a list of standard analyst products (Cope, 2004). While every analysis inevitably requires communication to the given audience, it is suggested here that crime analysis has traditionally placed a heavy focus on specifying the products that crime analysts produced. In specifying this point, "[t]here are seven types of charts that are commonly used by analysts; link charts, timelines, organizational charts, event flow charts commodity flow charts, phone toll analysis/cell phone analysis charts and social network analysis" (IACA, 2017, p. 262). In effect, the discipline emphasizes outputs or products, rather than outcomes or answers and solutions. This emphasis increases the conceptualization of crime analysis as being a unique discipline with specific product types and detracts from the idea of an analytical product simply being a part of communicating the results of analysis.

Perhaps relatedly, qualitative research conducted within the field indicates a lack of role and process understanding. Cope (2004) noted that one analyst indicated, "Analysis is an intuitive process, you can't just apply the tools to analysis, you should have a natural grasp of what is relevant because that's the way you work" (p. 199). Further, the article noted the analysts

were limited in their ability to articulate the process they used to analyze data, raising questions about the reliability and reproducibility of the analysis process. This is reinforced in available the literature. For example, in its book, IACA suggested that, "[t]he ability to cull through and evaluate copious amount of qualitative and quantitative information to determine relevant intelligence is not a skill, but rather a talent" (2017, p. 273), suggesting that there is something innate about analysis that cannot be taught.

As further evidence of the way the analysis function has been shaped by law enforcement, analysts continue to place an emphasis on domain knowledge and law enforcement experience. Analysts have pointed to the need to understand policing and be familiar with policing operations (Cope, 2004). This is reinforced by law enforcement officers, who are skeptical of the skills of analysts and do not understand the nature of their work (Weston, 2015). The tendency of analysis to focus on the 'tradecraft' of law enforcement analysis has been documented in the intelligence analysis literature (Johnston, 2005). Emphasizing tradecraft "implies that the methods and techniques of analysis are informal, idiosyncratic, unverifiable, and perhaps even unexplainable" (Johnston, 2005, p. 18), leading to an inability to measure the validity or reliability of such methods. This emphasis also reduces the potential for communicating the principles of analysis, as they are perceived to be part of the idiosyncratic process of analysis.

Taken in its totality, the literature from the discipline of crime analysis revealed an absence of clarity regarding the function and processes of a crime analyst, instead placing a focus on the types of methods employed or products created as the defining nature of analytical work. The effect of this has been noted in research, where Weston, Bennett-Moses, and Sanders (2019) found, as a result of a lack of role clarity, that analysts rely upon interpersonal skills to navigate

their workplace (Weston, 2019). It is suggested here that the confusion explored above is indicative of the way crime analysis has developed to perceive itself as a unique subdiscipline within law enforcement. Rather than drawing on literature from other fields involved in the analysis of data, crime analysis has been molded by what is needed by law enforcement, which can vary by agency. The outcomes identified above are representative of an attempt to find a common identifying purpose to crime analysis. However, by focusing on the outputs of analysts, rather than the analysis process, opportunities for growth within the discipline are stilted, and the ineffectiveness of crime analysis in informing the operations of law enforcement can be more easily understood.

As outlined above, the available research within the discipline suggests a lack of understanding of the role and process of an analyst. The focus on defining crime analysis by its components, and its continued emphasis on domain knowledge in the law enforcement context, reveal an absence of analytical identity. This lack of clarity in analyst function and role can be understood not as happenstance or the product of individual analyst or agency failures, but rather the result of the systematic development of analysis to fit law enforcement need.

Chapter 4: Discussion

The analysis above contributes to an understanding of how crime analysis has come to reinforce traditional police practice. The impetus for the development of crime analysis was born out of law enforcement's perceived need for the use and management of its own information, while the modern policing movement placed an increased emphasis on the need for information that led to the rise of the crime analyst as a job function based on law enforcement's conceptualization of and needs for the role. Research has noted that the ability to link crimes to

an offender is central to the work of criminal investigation (Oatley & Ewart, 2011). The use of this information; however, has been defined by law enforcement, rather than analysts, with a focus on the utility of individual pieces of information instead of an analysis of data to provide insight or generate new knowledge. This information, while valuable to an investigation, is data that can be analyzed, but not the product of analysis itself.

Data-driven strategies further embedded the role of the analyst within law enforcement, but the origins of the job remain rooted in traditional law enforcement's conceptualization of crime analysts as information collators. The advancement of technology and the increasingly complex nature of information work has contributed to analysts functioning as information collators and gatherers rather than skilled workers applying analytical methodologies, techniques, and tools for the generation of insights. The proliferation of information technologies and the complexity associated with extracting data has led to analysts being both enablers and tools of existing policing function, and the nature of this information sharing has been understood as the analytical function by both analysts and their law enforcement clients despite its lack of analytical value.

Through this process, analysts were not independent experts with a specific skill set applied to law enforcement but created and shaped within the existing priorities of traditional law enforcement approaches. The crime analysis literature supports that crime analysis has come to accept law enforcement's construction of the discipline as its own, "having absorbed the traditional values and culture of the department" (Sparrow, 2003, p. 5). As was explored, evidence with respect to the absence of clarity within crime analysis abounds. Definitional confusion about what crime analysis is combined with an emphasis on the outputs of analysis are indicative of the lack of a firm conceptualization on analysis function in law enforcement.

A review of the literature within the discipline also suggests that crime analysis has emphasized methods, tools, and products without a comprehensive understanding that these are simply the components employed by an analyst in the creation of insights. Absent from the available literature is a discussion about the process of analysis and the role of an analyst in assembling these methods in pursuit of an answer to an organizational question. This lack of clarity has contributed to the observations noted in research that analytical products are descriptive rather than analytical (Cope, 2004; Manning, 2001). Ultimately, the emphasis on law enforcement's perceived needs has remained, resulting in a discipline that has been defined by law enforcement, rather than used to inform law enforcement objectives and priorities.

Extending from this, the observations that crime analysis reifies traditional policing can be more easily understood. Crime analysis reinforces the standard model of policing because it developed out of those same traditional policing values, methods, and priorities. Rather than applying analytical processes to the context of law enforcement, the discipline of crime analysis has been molded by law enforcement to suit the needs of standard policing approaches. Having been defined by law enforcement needs and coming to adopt law enforcement's construction of the discipline, crime analysts work within the context of already-held law enforcement values. It is the construction of crime analysis from law enforcement objectives and crime analysis' retention of those values as the discipline evolved that underlie the findings that crime analysis reinforces traditional policing values.

This understanding of the way the origins of crime analysis has shaped the functions of crime analysis is essential for addressing its tendency to reinforce traditional policing values. The reifying nature of crime analysis within law enforcement is not simply the result of a lack of training or methodological understanding, nor is it simply a bad analyst or singular poor

environment that has resulted in the systemic reinforcement of traditional policing. Accordingly, discussions of skill development are unlikely to have a profound effect on the progression of the discipline. Instead, a concentrated focus on principles and frameworks for conceptualizing the role and processes of an analyst and their work, as well as clarifying the analytical identity, is suggested as a mechanism for progress within the field.

There are significant advantages to a clear analytical identity for crime analysis. Understanding that the analysis process is the central and defining function of the analyst will enable a repositioning of the emphasis on law enforcement domain knowledge. Coming to see the analyst as an entity unto itself, rather than the application to the law enforcement context, also creates the potential for learning from other analytical disciplines. The importance of the explicit development of this identity for crime analysis is apparent. As has been discussed above, law enforcement has a tendency to define and construct analyst function within its own need, rather than seek understanding or pursue change (Manning, 2001). Given this, it is unlikely that law enforcement will spontaneously evolve to effectively utilize analysts or that a fundamental understanding of analysis will be constructed from within law enforcement. While individuals may be the exception to the rule, the systemic change needed to influence crime analysis as a discipline is unlikely to occur as a byproduct of policing, and "fresh perspectives on analytical opportunities might be easier to find outside the department than inside" (Sparrow, 2003, p. 5).

Further, there are limitations to crime analysis continuing to function as it currently does. Crime analysts focused on strict typologies in methods, products, and utility are fundamentally at odds with the era of big data. As technology progresses, the existing crime analysis function of information collation and relation may either grow to become irrelevant or continue to serve existing law enforcement need rather than inform progress. By contrast, with a strong sense of

analytical identity, crime analysts can come to understand their role as the users of tools and assist in facilitating the generation of insight from the ever-growing quantity of available data.

Research has identified the difficulty in integrating "analysis into existing working principles that are embedded in police culture" (Cope, 2004, p. 202). It is the contention of this major paper that it is not simply a matter of better integration of analysis, but redefining the conceptualization of the analytical function within the discipline of crime analysis itself, and that, through a stronger sense of self, the discipline can begin to interact with and inform law enforcement in a way previously not possible. Given this, it is suggested that in order to influence law enforcement culture, crime analysis must realign and redefine itself, developing an understanding of the identity of an analyst independent of law enforcement's influence, coming to see analysis, rather than crime analysis, as the core component. With this understanding, law enforcement becomes the client of crime analysis, where analysts are consultants serving as analytical specialists, rather than a support role serving existing law enforcement operations. To be truly effective, it is suggested that crime analysis must work for law enforcement objectives, rather than be defined by them.

Chapter 5: Recommendations for an Analytical Identity

Having established both the absence of and the need for a sense of analytical identity, this major paper proposes the development of an identity for the profession of crime analysis as a critical step toward an analytical function capable of informing law enforcement operations. As a result of its origins within law enforcement, crime analysis has come to understand itself as law-enforcement specific, a unique entity within the law enforcement context suited to meet the requests of law enforcement as dictated by the agency. Much like Marrin (2017) suggested that

intelligence analysis could benefit from drawing on theory from interdisciplinary forms of analysis, it is suggested here that crime analysis has the potential to learn and draw on lessons from other analytical disciplines with respect to developing an understanding of the analytical process. Concepts from the field of data analysis, which has experienced a similar struggle with the development of identity (Hicks & Peng, 2019), are drawn upon given the perceived similarities in purpose and potential function. Much like crime analysts who use data collected through law enforcement investigations, data analysts work with data that has been gathered for organizational purposes (Matsui & Peng, 2016). While research studies often involve developing and executing a plan for collecting data prior to analysis, data analysts are focused on the development of questions and analysis of existing data, making it comparable to the circumstances crime analysts work in and useful for the purposes of comparison.

As the focus of the exploration presented below is on the overarching principles and frameworks for analysis, the resulting proposed identity presents a more global understanding of the role of the analyst, suggesting that it is the nature of the questions asked and the application of insights that differentiate crime analysts from other forms of analysis, rather than the specific tools or methods employed or products created. Ultimately, it is contended that engagement with, comparison between, and learning from other disciplines may be one way of progressing the field of crime analysis.

Components of Analytical Identity

Role and Purpose

Developing a consistent understanding of the role and purpose of an analyst can assist in communicating and teaching analytical principles (Hicks & Peng, 2019). Tukey (1962) noted

that, while many disciplines are defined by its problems, statistics has historically been defined by a set of tools (Grolemund & Wickham, 2014). As a result, Tukey (1962) proposed the term data analysis, which, while it encompassed the application of statistics, was not simply the use of a statistical method, but the application of these methods to a problem. "Data analysis is a larger and more varied field that inference, or incisive procedures, or allocation" (Tukey, 1962, p. 2). In laying the groundwork for the field of data analysis, he quoted Martin Wilk, noting that, "…we must teach an understanding of *why* certain sorts of techniques (e.g., confidence intervals) are useful" (Tukey, 1962, p. 13). This early conceptualization of data analysis remains with the field today, where it is suggested that the objective of analysis is to answer questions, and a data analyst is one who answers questions through the application of tools and methods (Peng & Matsui, 2016). In defining data analysis in this way, the role of analysts as one who utilizes specific skills to achieve an answer to an explicit question becomes the fundamental aspect of defining an analyst and a component that is transferrable across analysis domains.

As has been explored throughout this major paper, statistics focus on specific tools as a defining characteristic of a discipline is akin to the experience of crime analysis where the field has come to understand itself in terms of the tools it uses or the products it creates, seeing those elements as the core function and definition of the discipline. However, the view of an analyst proposed by data analysis provides insight into what it is that an analyst does, making it beneficial for developing a sense of identity. Hicks and Peng posited that a definition focusing on the fundamental concepts of analysis, such as the elements and principles of data analysis, "is a more productive way to define data science, where different individuals or disciplines can emphasize different elements and principles of a data analysis" (2019, p. 3). It is believed that adopting this definition can benefit the discipline of crime analysis. From this starting point,

crime analysis can begin to develop a sense of identity rooted in its own actions. This would allow the discipline to understand the ways it may contribute to the advancement of law enforcement operations instead of reinforcing existing traditional policing approaches.

Moreover, the field of data analysis has elaborated on the nature of questions analysts should seek to answer. Specifically, the types of questions to be asked of and by analysts are or ought to be descriptive, exploratory, inferential, predictive, causal, or mechanistic (Leek & Peng, 2015). By their nature, these questions go beyond stating facts to providing insight into the nature of a given problem and, at times, developing a solution. In this situation, the role of the analyst would be transformed to understand and interpret the problem and apply the required tools and methods to achieve an outcome. This conceptualization can assist crime analysis in ensuring they contribute to the progression of law enforcement. With a better understanding of the type of questions analysts ought to be focused on, analysts would have a means for distinguishing between work that is analytical in nature and work that requires other solutions. Further, research has demonstrated that analysts find decision-makers often ask for data to support or justify existing decisions, rather than for the purpose of understanding or developing new insights (Cope, 2004). Having a stronger understanding of the role of a crime analyst may enable the analyst to conduct inquiries and get at the analytical root of a question.

Further, this sense of identity provides a means of distinguishing crime analysis from intelligence analysis, which has been noted in the literature as a historically challenging distinction to make (Ratcliffe, 2007). As intelligence analysis is typically conceptually driven, rather than data driven (Katter, Montgomery, & Thompson, 1979), a conceptualization of the crime analyst as one who works with data to generate insight and answer questions for law enforcement separates the role of the intelligence analyst from the crime analyst. Accordingly, it

is suggested that the role and purpose of crime analysis could be understood as a way to answer questions of law enforcement using data, and the role of a crime analyst could be to answer questions about what, how, and why, moving beyond answering fact-based questions to those that seek to gain understanding.

In this proposed conceptualization, the role and process of a crime analyst retain much in common with other analytical disciplines. This has the benefit of allowing crime analysis to draw on lessons learned from other analytical disciplines. Instead of the methods employed or products created being the defining characteristic of the discipline, the unique component of crime analysis in this new conceptualization is simply the nature of the questions being asked and the process of interpreting and providing an answer where domain knowledge, in this case, the knowledge of law enforcement context, becomes relevant.

The above outlines a comprehensive understanding of the role of an analyst, where analysts use skills, including data knowledge, and employ methods and tools to achieve an answer to law enforcement. One of the perceived benefits of the process is the diminishing focus on domain knowledge. The crime analyst who functions in this way is not one who is an expert in law enforcement or who acts as an organizational cognitive repository, but who is able to use their expertise in analysis to understand organizational questions, apply appropriate methods and tools to data to obtain answers, and use law enforcement domain knowledge and context to interpret observations and communicate findings in ways that make them applicable and usable for the police organization. Understanding of the law enforcement environment is required, but only in order insofar as it contributes to an understanding of what questions to ask of the data and how to interpret results within that context, as “figuring out the best way to ask a question requires knowledge and consideration of the audience and what it is they need” (Peng, 2019,

para. 6). In reducing the focus on law enforcement experience and increasing the focus on the core aspects of analysis, including the ability to solicit information as it is relevant to the analysis at hand, it is believed that crime analysis can increase its potential to impact law enforcement.

Function and Process

Existing conceptualizations of the process of conducting crime analysis are focused on the intelligence cycle, which consists of various components, including data collection, collation, analysis, and dissemination. While oft-referenced, this process provides little insight into how this process is achieved and how it is that an analyst moves through this process to generate insight (Hulnick, 2006). Progressing from the conceptualization of an analyst being one who assembles tools and methods, a number of perspectives on the analysis process exist.

Matsui and Peng (2016) proposed a model of analysis epicycles, where the activities comprising a data analysis include stating and refining the question, exploring the data, building formal statistical models, interpreting the results, and communicating the results, with a set of three additional sub-processes for each step. The epicycle of analysis must also include setting expectations, collecting data, and comparing findings to expectations, and, if need be, revising expectations or adjusting data. This process begins to reveal the iterative nature of data analysis, expanding upon a basic step-by-step model to begin to address some of the nuances of conducting a detailed and rigorous analysis. Importantly, this model addresses the need to consider the audience at the outset. Rather than being focused on producing an output, Matsui and Peng's (2016) model suggested that the analyst's work begins with stating and refining the question. This conceptualization may be of benefit to crime analysis, as the literature has identified that analysts are often asked non-analytical questions (Weston, 2015). Again, this

suggests that analysts must be engaged with clarifying the questions posed by stakeholders. Understanding that the work of translating the questions of law enforcement clients into questions as a part of analysis may assist in crime analysis' pursuit of informing law enforcement, rather than accepting and responding the questions of law enforcement at face value. In effect, the onus is placed on the analyst to understand the analytical needs behind the questions being posed.

Grolemund and Wickham (2014) also produced a framework for the analysis process, likening the work of an analyst to the cognitive process of sensemaking. The literature on cognitive psychology outlines that humans retain knowledge about a topic in schemas, "a mental model that contains a breadth of information about a type of object or concept" (Grolemund & Wickham, 2014, p. 188). The sensemaking model suggests that, when new information is encountered, this information is compared against existing schemas, and information that do not fit within the existing schema are known as insights (Pirolli & Card, 2005). It is the generation of these insights that allows individuals to update their schemas on a given topic. Grolemund and Wickham drew parallels between the sensemaking process and the processes of data analysis suggesting that "data analysis is an extension of the internal cognitive processes that build knowledge" (2014, p. 200). Specifically, they noted that the process of exploring data analysis for insight is akin to trying to match information to existing schemas. By contrast, confirmatory data analysis, where analysts have a hypothesis and seek to corroborate or refute the hypothesis with available data, is likened to having an existing schema and comparing available data against these schemas. Grolemund and Wickham (2014) identified the benefit of having such a framework for analysis suggesting that making such a process explicit assists in organizing analytical methods. "Statistical pursuits can be associated with the steps of data analysis that they

perform or support" and "[i]ndividual techniques of data analysis, such as design of experiments and data visualization, can be categorized and criticised by identifying which problems they solve" (Grolemund & Wickham, 2014, p. 201). Again, the crime analysis literature indicates a focus on specific methods as a defining characteristic of analysis. Through the proposed sensemaking process, the discipline can come to understand its role as a user of methods, rather than being defined by a given method, a perspective that enables analysts to employ a variety of methods to achieve the analysis objectives.

In undertaking such a process, an analyst builds a data analysis or "the investigative process used to extract knowledge, information, and insights about reality from examining data" (Grolemund & Wickham, 2014, p. 185). In effect, the core work product of an analyst is their fulsome data analysis, not simply the resulting communication product. Hicks and Peng (2019) elaborated on this by proposing core outputs or the observable components of an analysis. These are identified as the *elements* and *principles* of data analysis. Elements included components of an analysis, such as code, scripts, or data visualization, and principles of data analysis included, among others, that an analysis is both transparent and reproducible (Hicks & Peng, 2019). The authors noted that, "this language provides the vocabulary and framework to have an informed debate and discussion" (Hicks & Peng, 2019, p. 3), counteracting the shortfalls observed in law enforcement analysts' focus on tradecraft (Johnston, 2005).

Collectively, these discussions of analysis processes elaborate substantially on the intelligence cycle referred to within the discipline of crime analysis, adding insight about how it is that an analyst engages with a problem. Specifically, these processes suggest that an analyst is a person who is able to effectively apply and utilize methods and tools in the process of developing insight and provides a framework for doing so. From here, it is not the product or the

tool that defines analysis, but a set of conjoined skills employed by the analyst in the greater sensemaking process. A data analyst is a person who "assemble[s] all of the tools and [applies] them to data to answer a relevant question – a question of interest to people" (Peng & Matsui, 2016, p. 2). These understandings of the process of analysis provide a means of furthering the work of a crime analyst by elaborating on the specifics of what it means to conduct analysis. Moreover, in reducing the emphasis on tradecraft, these descriptions of the analysis process contribute to the development of an analytical identity, where knowledge about analysis can be exchanged and shared in pursuit of progress and growth.

Skills

While analysis is not simply the accumulation of skills in and of itself, there is no denying that analysis relies heavily upon well-developed skills. Data literacy is believed to be a key and required skill for analysts (Weston, Bennett-Moses, & Sanders, 2019). Data literacy can be defined as "the ability to read, write and communicate data in context, including an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use case, the application and resulting value" (Logan, 2018, p. 13). Data literacy is distinct from technical and technological skills; the ability to appropriately ask questions of data is recognized as increasingly essential for crime analysts (Weston, Bennett-Moses, & Sanders, 2019). Understanding data relationships, data characteristics, and statistical assumptions, and, more importantly, the frameworks that guide these relationships, is central to the data sensemaking process (Hicks & Peng, 2019). For example, the data cleaning process relies upon an understanding of data structures, as does the ability to ask questions of the data and the ability to effectively and efficiently explore data. Manning noted that, "metaphorically, databases and their links, the terminals, even computers, are really only 'dumb pipes' through

which data flow. They represent capacity, future utility, but they must be implicated in some process to become useful" (2001, p. 99). Crime analysts analyze data available as the byproduct of law enforcement operations, and the ability to make use of this data is fundamental to effective crime analysis.

Management

The function of analytical supervision and management is largely unaddressed in the available research, but it plays a crucial role in defining the organizational function of crime analysts (Weston, Bennett-Moses, & Sanders, 2019). In a 1992 interview, Snyder introduced the idea of being "victimized by your lesser talents" (Weinberger, 1996, para. 8). As analysts require technical skills to, for example, navigate databases as part of their job, they can easily develop a reputation for being a resource for technical assistance, and their ability to extract information from systems may reinforce the perception of this being an analytical function. Analyst managers are essential to navigating the organization and ensuring analysts perform analytical work, rather than being limited to performing specific skills that the analyst may have developed in order to enable them to do analytical work, as "it is supervisors who can negotiate the intersection of intelligence products and organizational needs, driving the cultural and organizational change required for intelligence-led policing" (Weston, Bennett-Moses, & Sanders, 2019, p. 14). Additionally, feedback has been identified as a core component for the development of analysts (Peng & Matsui, 2016). The same is believed to be true for crime analysis, where research has identified the importance of feedback in developing the work of crime analysts (Weston, Bennett-Moses, & Sanders, 2019). In this way, managers can be seen as the leaders in driving an analytical identity.

Hiring

Having laid the groundwork for a renewed understanding of the function of a crime analyst, existing law enforcement structures present a challenge with respect to the hiring of analysts. Traditional public sector processes do not lend well to hiring and assessing cognitive skills (Corkill, Cunow, Ashton, & East, 2015). Analysis of 300 intelligence analyst job descriptions found that the focus on general public service attributes reflected the understanding of intelligence analysis as an administrative function (Corkill et al., 2015). Further research found little standardization or consistent understanding of the knowledge, skills, and abilities needed for hiring crime analysts (Amendola & Jones, 2010). Another study noted that, "recent recruitment aimed to attract graduates to the role in the hope that degrees… would provide the skills to think analytically and process various sources of information" (Cope, 2004, p. 189). Current law enforcement crime analyst postings place an emphasis on law enforcement experience and are focused on experience with specific tools, rather than the core principles needed for analysis, such as data literacy.

As hiring is essential to maintaining strong function, this misconception or misunderstanding of the skills required and the distinct role of the analyst represents a significant challenge to progress as a field. Hiring analysts with a strong conceptualization of the role and function of analysis would assist in overcoming some of the many challenges identified in the literature and contribute to the development of a collective analytical identity. Existing hiring processes would benefit from addressing the specific cognitive and technical skills required by an effective and efficient crime analyst.

Training

It has been suggested that training within the discipline of crime analysis may be responsible for the emphasis on descriptive, rather than explanatory analysis. O'Shea and

Nicholls suggested that "the general weakness in the capacity to train may well be a compelling explanation for the tendency to count crime rather than to analyze it" (2003, p. 249). Accordingly, some research has emphasized the need for training in thinking and reasoning skills for crime analysts (Evans & Kebell, 2012; Kringen, Sedelmaier, & Elink-Schuurman-Laura, 2017; Ratcliffe, 2004). Specifically, Evans and Kebell (2012) suggested that training in thinking skills is more essential than training in specific software or methods.

More than just thinking about specific skills, to contribute to a stronger sense of the function of an analyst, training ought to be principle-focused, working toward the development of a holistic understanding of analysis. While analysts do need training in specific methods and tools, emphasis should be placed on the application of these skills and the decision-making process to employ them in a way appropriate to the circumstances at hand. The most essential function of training is that it be appropriately situated within a context where training in methods and tools are understood as a part of the analytical and sensemaking process, not the definition or intended outcome in and of itself.

In sum, this chapter provides initial considerations and recommendations for the work of crime analysis and repositioning the crime analyst as an expert within their own discipline, rather than a position constructed by the needs of law enforcement. It is believed that, in developing this sense of analytical identity, crime analysts can begin to achieve the potential value offered by the role. With a developed understanding of the function of an analyst, crime analysts are better positioned to ensure their appropriate use within the law enforcement context and articulate their needs in order to be able to conduct analysis. Moreover, through an understanding of the role of an analyst, the process of analysis, and the skills required to do so, crime analysis can begin to form the building blocks for a comprehensive analytical identity through which

crime analysis may be able to overcome some of the limitations experienced by the discipline to date.

Chapter 6: Challenges and Barriers to Analytical Progress

This rethinking of analysis assists in re-conceptualizing the challenges faced by analysts. As previously identified, research indicates that challenges to analytical progress include law enforcement's continued emphasis on reactive policing approaches, driven by the pursuit of short-term goals (Belur & Johnson, 2018), as well as a lack of organizational clarity around how to task crime analysts and utilize analytical products. In one qualitative study, law enforcement officers "admitted that they perhaps underutilised the capacities of analysts, mainly because they were unable to task them intelligently" (Belur & Johnson, 2018, p. 775). This theme has been repeatedly cited in the literature, with a survey of law enforcement agencies in the United States concluding that agencies are limited in their ability to use crime analysis effectively (Boba Santos & Taylor, 2014). Specifically, "poor problem-oriented approaches, poor analytical thinking, and a culture that does not support innovation… all contribute to the lack of integration of knowledge into practice (Cope, 2004, p. 196). Another oft-cited barrier to the effectiveness of crime analysis include issues with data quality (Cope, 2004; Santos, 2012).

In light of the renewed conceptualization of the work of analysts, these challenges can be reframed as reflecting a lack of data culture within law enforcement. More than just technological capacity, data culture speaks to an organization's ability to make use of its own data effectively and efficiently (Nadella, 2014). As the criminal justice system has its roots in the common law approach, law enforcement primarily achieves change through reaction to court decisions. Given this, many of the decisions made, including the implementation of the major

case management model, are focused on achieving court requirements without proactive consideration of data needs. This reality is reflected in the observation that crime analysts are forced to use existing police database and cumbersome methods of extracting data, rather than being provided access to relational database sources (Sanders & Condon, 2017). This is a notable limitation given that "the quality of crime analysis is a function of how well a law enforcement agency can store and access data" (O'Shea & Nicholls, 2002, p. 14). Further, the nature of the questions asked by law enforcement, including asking for data or analysis to justify decisions, is reflective of a failure to understand how analysts can work (Belur & Johnston, 2018; Weston, 2015). The above suggested processes of analysis focus on contexts where questions directed at analysts are appropriate to begin with. However, exploration of the work of crime analysis has revealed that law enforcement's questions are tended to be based less to generate new insights than to maintain the traditional policing status quo. These situations are reflective of and contribute to a lack of data culture and analytical understanding from within law enforcement.

Recently pointed out as being relevant to the field of data analysis, the design thinking approach may be a process through which analysts can overcome some of these limitations. Design thinking, adopted from the field of design, notes that the questions asked of designers reflect the understanding of the asker. "In a design project, it is often not at all clear what 'the problem' is; it may have only been loosely defined by the client, many constraints and criteria may be un-defined, and everyone involved in the project may know that goals may be re-defined during the project. In design, 'problems' are often defined only in relation to ideas for 'solution', and designers do not typically proceed by first attempting to define their problems rigorously" (Cross, 2011, p. 120). This is comparable to a limitation expressed by some of the research on crime analysis, where questions posed by law enforcement may be asked within their frame of

understanding, rather than an understanding of what the analyst can do. The value of design thinking is in framing a problem appropriately to achieve an outcome that meets the needs of clients, rather than simply what is asked for. While the absence of data culture is likely to be a barrier to analyst progress, the application of design thinking provides a means by which analysts can grow their skills and consistently produce results that enable others to see the value and potential of analysis. In a blog post regarding the construction of a data analyst, prominent data analyst Roger Peng noted that, "good data analysts do not solve the problem that is handed to them" (2018, para. 7), and that "the first job of the data analyst is to discover the real underlying problem" (2018, para. 9). In this way, the limitations noted in the research become a part of the challenge of conducting analysis for an external audience, who do not retain the same degree of domain knowledge. This perspective shifts this challenge from a constraint on analysis to a part of the analysis process. The design thinking process offers a method for thinking about this, referred to as the 'double diamond', a concept outlined by the British Design Council. In this process, designers iterate through the processes of discovering the problem, defining the area of focus, developing potential solutions, and delivering a final solution (Nessler, 2016). This approach is based on the understanding that, "the human centred design process starts with a good understanding of people and the needs that design is intended to meet" (Nessler, 2016, para. 3). This is transferrable to analysis, where a core aspect of conducting analysis may be the potential that law enforcement are unaware of how to best utilize and employ analysts.

In this way, the challenges experienced by analysts in conducting analysis within the law enforcement culture are reframed through an understanding of the role and process of analysis. While still a notable constraint, design thinking poses a potential solution to the challenges posed

by a lack of data culture reframing them as part of the challenge of conducting all analysis and providing tools with which to approach such challenges.

Chapter 7: Conclusion

This major paper presents a new contribution to criminal justice through its account of the development of analysis within the law enforcement environment and the identification of opportunities for continued growth of analysis as a discipline with a renewed sense of purpose and value. Research has identified that crime analysis has fallen short of its potential and, rather than working to generate insight for the progress of law enforcement function, the work of crime analysts may inadvertently be enabling traditional approaches to policing, which has a primarily reactive focus. This major paper establishes the ways in which the evolution of law enforcement and the increased focus on information use in policing have both constructed the function of crime analysis and entrenched this understanding as a specific discipline unique to the law enforcement function. Specifically, increased emphasis on the use of information and the value of that information in solving crime has contributed to the function of a crime analyst, constructing a role that includes operational reporting and database querying and adopting this work as analysis. As new police strategies were increasingly data-driven, they raised the profile of analytical work without expanding analytical capacity or asking questions of that required analytical processes. It is suggested in this major paper that analysts have adopted this construction of their job function meeting the needs of law enforcement in a way that has led to a discipline that has a strict understanding for what is and is not crime analysis, bounded largely by a specific set and type of products, methods, and tools, rather than by the nature of questions being answered. This is indicative of an absence of analytical identity and a lack of clarity about

the role and function of the analyst. The research presented in this major paper leads to the conclusion that this lack of analytical identity has played a contributing role in the analyst being relegated to working within traditional policing structures, rather than informing them.

Accordingly, opportunities for progress exist, including a renewed focus on an understanding of identity around the role and process of analysis. This major paper outlines some initial steps toward this understanding by proposing preliminary considerations for how crime analysis could be better understood. Specifically, principles from the field of data analysis are drawn on in this major paper to suggest that the role of a crime analyst is to employ skills, methods, and tools to data to generate insights. This differs from existing conceptualizations of crime analysis, which have traditionally focused on specific typologies, and repositions the crime analyst as one whose value is in their analytical skills, rather than their law enforcement experience.

While this major paper presents a new contribution to the literature in the field of crime analysis, additional research could build significantly upon this preliminary conceptualization. Specifically, this major paper has hypothesized that crime analysts currently understand their role as defined by the needs of law enforcement. Additional ethnographic studies of crime analysis could shed light on the degree to which this is true. Further, this major paper only briefly addressed principles from the discipline of data analysis. While data analysis is believed to be a beneficial comparison for crime analysts, a fulsome comparison with other analytical disciplines may generate additional insights. For example, Marrin (2017) identified that intelligence analysis stands to grow through interdisciplinary comparison, and crime analysis may also benefit from similar work. Ultimately, this major paper is intended to initiate a

conversation, and further work could assist in confirming or clarifying the concepts presented here.

In effect, this major paper suggests that crime analysis and law enforcement agencies stand to gain substantially by undertaking a detailed and rigorous exploration of other disciplines to better understand and identify what analysis is. The discussion undertaken in this major paper provides a mechanism for describing the differences between analyses in a manner that is not specifically tied to the science or the application underlying the analysis. Hicks and Peng noted that being able to name the principle and elements of data analysis "allows data analysts, who may be working in different fields or on disparate applications, to have set of concepts that they can use to have meaningful discussions. The elements and principles therefore broaden the landscape of data analysts and allow people from different areas to converse about their work and have a distinct shared identity" (2019, p. 19). While the problems facing crime analysis are noted in this major paper, the focus remains on the potential of crime analysis to develop into an impactful discipline, and it is suggested that the development of an analytical identity from principles in related analytical disciplines provides a mechanism for doing so.

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