

6.1: Policing Today

Chapter 6 - Modern Policing and The Police Organization

Policing Today

Police function as an active element of legislation, the enforcement of the law. But perhaps the most enduring myth of criminal justice is the actual role of the police officer in our society. From early television programs such as *Dragnet* up to today's most compelling crime dramas, cops live a life full of danger, always encountering dangerous fugitives, serial killers, and other villains that must be outwitted, outfought, and outgunned. Of course, danger is part of the police job. It is, however, a mistake to assume that this is the only job that the police do. Most of what the police do on a daily basis is to deal with what Herman Goldstein (1990) called "the residual problems of society."

Police Functions

Movies and television have defined the role of the police in the popular imagination as that of "crime fighter." In reality, catching "bad guys" and investigating crimes is only a small fraction of what the police are called upon to do every day. Calls for social services order maintenance tasks are far more common.

A large fraction of the average police officer's shift is spent helping people with problems that have nothing to do with apprehending felons. People get hurt in automobile accidents, and police officers are there to render aid. People lose things ranging from cell phones to children and expect the police to help find them. Some authors estimate that well over fifty percent of calls for police services involve these kinds of social service tasks. By comparison, these same authors estimate that only about 20% of calls for police services relate to crime.

Many law enforcement activities have to do with keeping society running smoothly. These things-such as traffic control, crowd control, and moving prostitutes off the streets-are frequently referred to as "order maintenance" activities. A key difference between law enforcement and order maintenance is that order maintenance activities are not generally concerned with the letter of the law, but rather keeping the peace. Arrest is always an option when an officer is trying to preserve the peace, but less formal solutions are far more commonly employed. For example, when the driver of a stopped car that is blocking traffic complies with an officer's request to move along, no citation is issued.

The American Bar Association (1986), in a document called *Standards Relating to the Urban Police Function*, lists 11 responsibilities of the police:

1. identify criminal offenders and criminal activity and, where appropriate, to apprehend offenders and participate in subsequent court proceedings;
2. reduce the opportunities for the commission of some crimes through preventive patrol and other measures;
3. aid individuals who are in danger of physical harm;
4. protect constitutional guarantees;
5. facilitate the movement of people and vehicles;
6. assist those who cannot care for themselves;
7. resolve conflict;
8. identify problems that are potentially serious law enforcement or governmental problems;
9. create and maintain a feeling of security in the community;
10. promote and preserve civil order; and
11. provide other services on an emergency basis.

The last element in this list provides the primary reason why the police are called upon to deal with the "residual problems" of society: There is no one else available twenty-four hours a day, seven days a week.

Another key factor that makes the police unique is what some authors have referred to as a "monopoly on the use of force." The authorization to use force means that the police hold a position of great power within our society, and this translates into a great responsibility to use that force ethically.

Despite all of that power, there is a trend among policing experts to call for broad discretion for police officers. Officers who have their hands bound by excessive policies and procedures cannot solve community problems. Officers must have the authority to identify community problems, tailor solutions to those problems, and implement those solutions. Even in departments where

community policing is not the dominant paradigm, officers still have a great deal of discretion. For example, officers decide who gets a warning and who gets a citation. Officers decide who is arrested. Officers decide when force is necessary. Of course, some obvious factors are used by officers when making a discretionary decision. The seriousness of a crime and the strength of evidence, for example, are factors in the decision to make or not make an arrest. Personal factors also come into play; researchers discovered long ago that the demeanor of the suspect plays an important role in the decision to arrest. Respectful and deferential citizens are less likely to be arrested than rude or belligerent ones.

The Structure of Policing in America

Local police departments make up more than two-thirds of the 18,000 state and local law enforcement agencies in the United States. The Bureau of Justice Statistics (BJS) defines a local police department as a general-purpose law enforcement agency, other than a sheriff's office, that is operated by a unit of local government such as a town, city, township, or county. Tribal police are classified as local police BJS statistics. In 2008, local police departments had about 593,000 full-time employees, including 461,000 sworn officers. About 60% of all state and local sworn personnel were local police officers.

Federal Law Enforcement Agencies

The Federal Bureau of Investigation (FBI): The FBI is housed within the United States Department of Justice. The FBI is rather unique in that it has both law enforcement and national security concerns as part of its mission. As the FBI's Mission Statement puts it, they are a "... national security organization with both intelligence and law enforcement responsibilities..." The Mission Statement further explains, "The mission of the FBI is to protect and defend the United States against terrorist and foreign intelligence threats, to uphold and enforce the criminal laws of the United States, and to provide leadership and criminal justice services to federal, state, municipal, and international agencies and partners." The FBI employs 13,785 special agents and 22,117 support professionals, such as intelligence analysts, language specialists, scientists, information technology specialists, and other professionals (FBI, 2013).

The Bureau of Alcohol, Tobacco, and Firearms (ATF): The ATF has a reputation for dealing with illegal firearms. Its mission is rather broader in reality. Housed within the United States Department of Justice, the ATF protects American communities from violent criminals, criminal organizations, the illegal use and trafficking of firearms, the illegal use and storage of explosives, acts of arson and bombings, acts of terrorism, and the illegal diversion of alcohol and tobacco products (ATF, 2013).

The Drug Enforcement Administration (DEA): "The mission of the Drug Enforcement Administration (DEA) is to enforce the controlled substances laws and regulations of the United States and bring to the criminal and civil justice system of the United States, or any other competent jurisdiction, those organizations and principal members of organizations, involved in the growing, manufacture, or distribution of controlled substances appearing in or destined for illicit traffic in the United States; and to recommend and support non-enforcement programs aimed at reducing the availability of illicit controlled substances on the domestic and international markets" (DEA, 2013).

The U.S. Marshals Service : "The U.S. Marshals Service (USMS) is the nation's oldest and most versatile federal law enforcement agency. Federal Marshals have served the country since 1789, often times in unseen but critical ways. The USMS is the enforcement arm of the federal courts, and as such, it is involved in virtually every federal law enforcement initiative. Presidentially appointed U.S. Marshals direct the activities of 94 districts – one for each federal judicial district. More than 3,950 Deputy Marshals and Criminal Investigators form the backbone of the agency. Among their many duties, they apprehend more than half of all federal fugitives, protect the federal judiciary, operate the Witness Security Program, transport federal prisoners, conduct body searches, enforce court orders and Attorney General orders involving civil disturbances and acts of terrorism, execute civil and criminal processes, and seize property acquired by criminals through illegal activities."

The Secret Service: The United States Secret Service began as an agency dedicated to the investigation of crimes related to the Treasury, and then evolved into the United States' most recognized protection agency. The Secret Service was a part of the Department of the Treasury until March 1, 2003, when it became a part of the Department of Homeland Security. "The mission of the United States Secret Service is to safeguard the nation's financial infrastructure and payment systems to preserve the integrity of the economy, and to protect national leaders, visiting heads of state and government, designated sites and National Special Security Events."

The Citizenship and Immigration Service (USCIS): U.S. Citizenship and Immigration Services is the government agency that oversees lawful immigration to the United States. "USCIS will secure America's promise as a nation of immigrants by providing accurate and useful information to our customers, granting immigration and citizenship benefits, promoting an awareness and

understanding of citizenship, and ensuring the integrity of our immigration system. The agency is composed of over 19,000 government employees and contractors of USCIS working at 223 offices across the world.

Transportation Security Administration (TSA) . The primary mission of the TSA is to protect travelers and interstate commerce. TSA uses a risk-based strategy and works closely with transportation, law enforcement, and intelligence communities to set the standard for excellence in transportation security.

State Law Enforcement Agencies

Every state in the United States has a state-level police force with the exception of Hawaii. The largest of these state-level agencies is the California Highway Patrol.

One of the major purposes of the state police in most jurisdictions is to provide patrol services, especially on remote highways where local law enforcement is sparse. State police are often called upon to aid local law enforcement in criminal investigations that are complex or cross local jurisdictional lines. Often, they are responsible for maintaining centralized criminal records for the state, operating crime labs, and training local officers.

Local Law Enforcement Agencies

In the United States today, there is a Hollywood generated myth that the federal government does major fraction of the law enforcement workload. This is not true. The vast majority of criminal cases are generated by local agencies such as sheriffs' departments and local police departments.

Sheriffs' Offices

According to the BJS (Burch, 20012), an estimated 3,012 sheriffs' offices performing law enforcement functions in the United States employed 369,084 sworn and civilian personnel. Sheriffs' offices represented approximately a fifth of the estimated 15,600 general-purpose law enforcement agencies operating in the United States. Although sheriffs' offices may have countywide responsibilities related to jail operation, process serving, and court security, their law enforcement jurisdictions typically exclude county areas served by a local police department. In certain counties, municipalities contract with the sheriffs' office for law enforcement services. Large agencies (employing 100 or more sworn personnel) represented about 12% of all sheriffs' offices but employed nearly two-thirds (65%) of all full-time sworn personnel.

Local Police Departments

About half of local police departments employed fewer than 10 sworn personnel, and about three-fourths served a population of less than 10,000. In 2007, about 1 in 8 local police officers were women, compared to 1 in 13 in 1987. About 1 in 4 officers were members of a racial or ethnic minority in 2007, compared to 1 in 6 officers in 1987. In 2007, more than 4 in 5 local police officers were employed by a department that used physical agility tests (86%) and written aptitude tests (82%) in the hiring process, and more than 3 in 5 by one that used personality inventories (66%).

Wilson's Police Management Styles

James Wilson (not to be confused with O. W. Wilson), identified three police management styles:

The watchman style of management focuses on order maintenance. Officers often ignore minor violations of the law, unless the violation constitutes a breach of the peace. Minor violations and disputes between citizens are largely handled in an informal way.

The legalistic style tends to handle matters formally. In other words, policing is done "by the book." The administrative emphasis is on reducing line officer discretion and effecting unvarying, impartial arrests for all violations.

The service style emphasizes community service above enforcing the law. Arrest is often seen as a last resort, used only when referrals to social service organizations and agencies will be ineffectual.

Quasi-military Features

As one of Peel's major innovations, the organization of police agencies along military lines has withstood the test of time. Police officers in most jurisdictions still wear uniforms, carry weapons, and have military ranks. These ranks suggest a military style, authoritarian command structure where orders come down from the top. This militaristic view of the police is encouraged by political rhetoric such as the "war on crime" and the "war on drugs." While most America citizens take this quasi-military organization for granted, there are those that see it as a problem.

Detractors of the quasi-military organization of America's police forces suggest that by subscribing to the idea that they are engaged in a war, police officers will be tempted to slip into the mentality that "all is fair in war." They fear that a warfare

mentality will lead to an “ends justify the means” mentality that results in unethical police conduct such as perjury, brutality, and other abuses of power. Other critics feel that the militaristic look of police uniforms, especially BDUs and SWAT gear, serve to intimidate the public.

The Police Bureaucracy

Modern American Police agencies are characterized by a bureaucratic structure. The positive aspects of bureaucratic organizations revolve around competence and clarity. Tasks and duties are specialized, qualifications for different positions are carefully and clearly defined, everyone acts according to rules and regulations, and authority exists within a clearly defined hierarchy. The idea of bureaucracy is to improve efficiency and effectiveness. The downside to this is often a lack of flexibility, being bogged down in “red tape,” and ignoring the human element of serving the community.

Key Terms

American Bar Association, BDU, Bureau of Alcohol, Tobacco, and Firearms (ATF), Citizenship and Immigration Service (USCIS), Drug Enforcement Administration (DEA), Federal Bureau of Investigation (FBI), James Wilson, Legalistic Style, Local Police Department, Order Maintenance, Quasi-Military Organization, Residual Problems of Society, Secret Service, Service Style, SWAT, Sworn Officer, Transportation Security Administration (TSA), Tribal Police, U.S. Marshals Service (USMS), Watchman Style

Police Organization, and Functions ^[90]

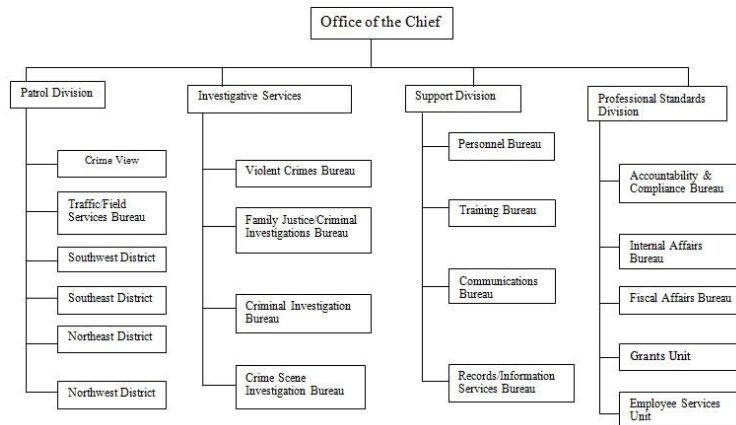


Figure 6.1 Fresno CA Police Department Organizational Chart ^[91]

The Investigative Function ^[92]

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Quotable

“A good investigator needs to be conscious of his or her own thinking, and that thinking needs to be an intentional process.”

It is too bad we cannot just provide you with a basic template to follow every time you needed to conduct a criminal investigation; but it is not that simple. Criminal investigations can be imprecise undertakings, often performed in reaction to unpredictable and still-evolving events with incomplete information to guide the process. As such, it is impossible to teach or learn a precise methodology that can be applied in every case. Still, there are important concepts, legal rules, and processes that must be respected in every investigation. This book outlines these concepts, rules, and processes with the goal of providing practical tools to ensure successful investigative processes and investigative practices. Most importantly, this book informs you on how to approach the investigative process using “investigative thinking.” In this first chapter, we set the foundation for the book by calling attention to five important topics:

1. Criminal investigation as a thinking process
2. The need to think through the process
3. Towards modern-day investigation
4. The path to becoming an investigator
5. Understanding the investigative mind

Topic 1: Criminal Investigation as a Thinking Process

Criminal investigation is a multi-faceted, problem-solving challenge. Arriving at the scene of a crime, an officer is often required to rapidly make critical decisions, sometimes involving life and death, based on limited information in a dynamic environment of active and still evolving events. After a criminal event is over, the investigator is expected to preserve the crime scene, collect the evidence, and devise an investigative plan that will lead to the forming of reasonable grounds to identify and arrest the person or persons responsible for the crime. To meet these challenges, police investigators, through training and experience, learn investigative processes to develop investigative plans and prioritize responses.

In this book, these investigative responses, information analyses, and plan-making skills are broken out using illustrations of both tactical and strategic investigative thinking. The aim of the book is to guide you into the structured practices of tactical investigative response and strategic investigative thinking.

Criminal investigation is not just a set of task skills, it is equally a set of thinking skills. To become an effective investigator, these skills need to be consciously understood and developed to the point where they are deliberately engaged to work through the problem-solving process that is criminal investigation. Trained thinking and response can be difficult to adapt into our personal repertoires because we are all conditioned to be much less formal and less evidence driven in our everyday thinking. Still, as human beings, we are all born investigators of sorts. As Taber (2006) pointed out in his book, *Beyond Constructivism*, people constantly construct knowledge, and, in our daily lives, we function in a perpetual state of assessing the information that is presented to us. Interpreting the perceptions of what we see and what we hear allows us reach conclusions about the world around us (Taber, 2006). Some people are critically analytical and want to see evidence to confirm their beliefs, while others are prepared to accept information at face value until they are presented facts that disprove their previously held beliefs. Either strategy is generally acceptable for ordinary people in their everyday lives.

Topic 2: The Need to Think Through the Process

Diametrically opposing the analysis processes of everyday people, in the role of a police investigator, the process of discovering, interpreting, and determining the validity of information is different and this difference is critical. As an investigator, it is no longer sufficient to use the strategies that ordinary people use every day. Instead, it is incumbent on investigators to critically assess all the information they encounter because every investigation is an accountable process in which the investigator is not just making a determination about the validity and truth of the information for personal confirmation of a belief. Rather, the police investigator is responsible and empowered under the law to make determinations that could significantly affect the lives of those being investigated as well as the victims of crime.

The investigator's interpretation of information and evidence commonly requires answers to many questions that can lead critical of decisions, actions, and outcomes, such as:

- What must be done to protect the life and safety of persons?
- Should force, up to and including deadly force, be used to resolve a situation?
- Who will become the focus or subject of a criminal investigation?
- What is the best plan to apprehend the person or persons responsible for a criminal act?
- Will someone be subjected to a search of their person or of their home?
- Will someone be subjected to detention or arrest and questioning for a criminal act?
- Will someone have a criminal charge sworn against them?
- Will someone be subjected to a criminal trial?
- Will someone's liberty as a free person be at risk?
- Will justice be served?
- Will the community be protected?

Significant to these possible outcomes, the investigator must always be ready to explain their thinking and actions to the court. For example, when an investigator is asked by a court, "How did you reach that conclusion to take your chosen course of action?" an investigator must be able to articulate their thinking process and lay out the facts and evidence that were considered to reach their conclusions and form the reasonable grounds for their actions and their investigative decision-making process. For an investigator speaking to the court, this process needs to be clear and validated through the articulation of evidence-based thinking and legally justifiable action. Thinking must illustrate an evidence-based path to forming reasonable grounds for belief and subsequent action. Thinking must also demonstrate consideration of the statutory law and case law relevant to the matter being investigated.

Considering this accountability to outcomes, it is essential for police investigators to have both the task skills and the thinking skills to collect and analyze evidence at a level that will be acceptable to the criminal justice system. Investigation is the collection and analysis of evidence. To be acceptable to the court, it must be done in a structured way that abides by the legal rules and the appropriate processes of evidence collection. Additionally, it must be a process the investigator has documented and can recall and articulate in detail to demonstrate the validity of the investigation.

Obviously, it is not possible for someone to remain in a constant state of vigilance where they are always critically assessing, documenting, and determining the validity of every piece of information they encounter. However, when on duty, it is frequently necessary for a police investigator to do this. For a police investigator, this needs to be a conscious process of being mentally engaged and “switched on” to a more vigilant level of information collection, assessment, and validation while on duty. A police investigator must master this higher and more accountable level of analytical thinking for both tactical and strategic investigative response. The “switched on” police investigator must:

- Respond appropriately to situations where they must protect the life and safety of persons
- Gather the maximum available evidence and information from people and locations
- Recognize the possible offence or offences being depicted by the fact pattern
- Preserve and document all evidence and information
- Critically analyze all available information and evidence
- Develop an effective investigative plan
- Strategically act by developing reasonable grounds to either identify and arrest those responsible for criminal acts, or to eliminate those who are wrongfully suspected

Most traditional police training provides new officers with many hours of instruction in the task skills of investigation. However, the learning of investigative thinking skills is expected to develop through field experience, learning from mistakes, and on the job mentoring. This learning does not always happen effectively, and the public expectations of the justice system are evolving in a model where there is little tolerance for a mistake-based learning.

The criminal investigation of serious crimes has always drawn a substantial level of interest, concern, and even apprehensive fascination from the public, the media, and the justice system. Police actions and investigations have been chronicled and dissected by commissions of inquiry and the media. From the crimes of the serial killers like Paul Bernardo (Campbell, 1996), and Robert Pickton (Oppal, 2013) to the historical wrongful convictions of David Milgaard (MacCallum, 2008) and Guy Paul Morin (Kaufman, 1998), true life crimes are scrutinized, and the investigations of those crimes are examined and critically assessed.

When critiquing past investigations, the same types of questions are frequently asked:

- Is it possible that the wrong person was arrested or convicted?
- Is it possible that other persons were involved?
- Were all the possible suspects properly eliminated?
- Was information properly shared among police agencies?
- Did the investigators miss something?
- Was all the evidence found?
- Was the evidence properly interpreted?
- Were the investigative theories properly developed and followed to the correct conclusion?
- Was tunnel vision happening and misdirecting the investigation?

Today, transparency throughout the criminal justice system and public disclosure of evidence through investigative media reports make it much easier for the public and the media to examine the investigative process. Public and media access to information about police investigative techniques and forensic tools has created an audience that is more familiar and sophisticated about police work. The ability of both social and traditional media to allow public debate has created a societal awareness where a higher standard for the investigation of serious crimes is now an expectation.

One only needs to look at the historical and contemporary judicial reviews and public inquiries to appreciate that there is an expectation for police investigators and police organizations to maintain and demonstrate a high level of competency. In a judicial review, it is often too late if an investigator discovers that they have pursued the wrong theory or they have failed to analyze a piece of critical information or evidence. These situations can be career-altering or even career-ending. A good investigator needs to be conscious of his or her-own thinking, and that thinking needs to be an intentional process.

Topic 3: Towards Modern-Day Investigation

Today, criminal investigation is a broad term encompassing a wide range of specialties that aim to determine how events occurred, and to establish an evidence-based fact pattern to prove the guilt or innocence of an accused person in a criminal event. In some cases, where a person is found committing the criminal act and apprehended at the scene, the criminal investigation is not a complex undertaking. However, in cases where the criminal event is discovered after the fact, or when the culprit is not readily apparent, the process of criminal investigation becomes more complex and protracted.

Although in both cases the criminal investigator must follow practices of identifying, collecting, recording, and preserving evidence; in the case of the unknown suspect, additional thinking skills of analysis, theory development, and validation of facts must be put to work.

The craft of criminal investigation has been evolving since the birth of modern policing in the mid-1700s when the Chief Magistrate of Bow Street, Henry Fielding, organized a group of volunteer plainclothes citizens and tasked them to attend the scenes of criminal events and investigate crimes. This group became known as the Bow Street Runners. Their existence speaks to an early recognition that attending a crime scene to gather information was a timely and effective strategy to discover the truth of what happened (Hitchcock, 2015).

From these early investigators, one of the first significant cases using forensic evidence-based investigation was recorded. To summarize the account by McCrery (2013) in his book *Silent Witness*; in one notable recorded case in 1784, the Bow Street Runners removed a torn piece of paper wadding from a bullet wound in the head of a murder victim who had been shot at point-blank range. In this early era of firearms, flintlock muskets and pistols required muzzle loading. To muzzle load a weapon, gunpowder would be poured down the barrel of the weapon, and then a piece of “wadding paper” would be tamped into place on top of the gunpowder using a long metal rod. The wadding paper used in this loading process was merely a piece of thick dry paper, usually torn from a larger sheet of paper kept by the shooter to reload again for the next shot. The musket ball bullet would be pushed down the barrel on top of the wadding paper. When the gun was fired, the wadding paper would be expelled by the exploding gunpowder, thus pushing the lead ball-bullet out of the barrel as a deadly projectile. This loading process required the shooter to be in possession of dry gunpowder, wadding paper, and musket balls to reload and make the weapon ready to fire. The Bow Street Runners considered this weapon loading practice and knew their shooter might be in possession of wadding paper. Upon searching their prime suspect, they did find him in possession of that kind of paper and, in a clever forensic innovation for their time, they physically matched the torn edges of wadding paper found in the victim’s wound to a larger sheet of wadding paper found in the pocket of their suspect. From this evidence, the accused was convicted of murder (McCrery, 2013).

This use of forensic physical matching is an example of circumstantial forensic evidence being used to link a suspect to an offence. This type of early forensic evidence also illustrates the beginnings of what exists today as a broad variety of forensic sciences to aid investigators in the development of evidence. This is also the beginning of forensic evidence being recognized as an investigative tool. In 1892, not long after the Bow Street Runners investigation, Sir Francis Galton published his book on the study of fingerprints. In 1900, Galton’s work was used by Sir William Henry who developed and implemented the Henry System of fingerprint classification, which is the basis of the fingerprint classifications system still in use today (Henry, 1900).

Only a few years earlier, in 1886, the use of photography for the first Rogues Gallery of criminal photographs was implemented by the New York City Police Department. This first Rogues Gallery was an organized collection of photographs of known criminals taken at the time of their most recent conviction for a crime (Byrnes, 2015). Prior to this organized collection of criminal photos, facial characteristics on wanted posters had been limited to sketch artists’ renderings. With the advances evolving in photography, having the ability to preserve an actual picture of the suspect’s face amounted to a significant leap forward. With this innovation of photography, the use of mugshots and photographic identification of suspects through facial recognition began to evolve.

These early forensic innovations in the evolution of criminal investigation (such as physical matching, fingerprint identification, and facial recognition systems) demonstrate a need for investigators to develop the knowledge and skills to locate and utilize physical evidence that enables circumstantial links between people, places, and events to prove the facts of criminal cases. Physical evidence is the buried treasure for criminal investigators. Physical evidence can be collected, preserved, analyzed, and used in court to establish a fact. Physical evidence can be used to connect an accused to their victim or used at a crime scene to establish guilt or innocence. Forensic evidence may prove a point in fact that confirms or contradicts the alibi of an accused, or one that corroborates or contradicts the testimony of a witness.

Another significant development in forensic evidence from the 1800s started with the work of French criminal investigator Alphonse Bertillon who developed the Bertillon system of recording measurements of physical evidence (Petherick, 2010). One of Bertillon’s students, Dr. Edmond Locard, a medical doctor during the First World War, went on to further Bertillon’s work with his own theory that a person always leaves some trace of themselves at a crime scene and always takes some trace of the crime scene

with them when they leave. This theory became known as “Locard’s Exchange Theory” (Petherick, 2010). To this day, Locard’s theory forms the foundational concepts of evidence transfer theory.

Today, the ability of forensic experts to identify suspects and to examine physical evidence has increased exponentially when compared to early policing. Scientific discoveries in a wide range of disciplines have contributed to the development and evolution of forensic specialties in physical matching, chemical analysis, fingerprints, barefoot morphology, odontology, toxicology, ballistics, hair and fiber, biometric analysis, entomology, and, most recently, DNA analysis.

Many of these forensic science specialties require years of training and practice by the practitioner to develop the necessary level of expertise whereby the courts will accept the evidence of comparisons and subsequent expert conclusions. Obviously, it is not possible for a modern-day investigator to become a proficient practitioner in all of these specialties. However, the modern-day investigator must strive to be a forensic resource generalist with an understanding of the tools available and must be specialist in the deployment of those tools to build the forensic case.

In a criminal investigation, there is often a multitude competing possibilities guiding the theory development of how a criminal incident occurred with circumstantial links pointing to who committed the crime. Competing theories and possibilities need to be examined and evaluated against the existing facts and physical evidence. Ultimately, only strong circumstantial evidence in the form of physical exhibits, testimony from credible witnesses, or a confession from the accused may satisfy the court beyond a reasonable doubt. Critically, the quality of an investigation and the competency of the investigators will be demonstrated through the manner in which that evidence was located, preserved, analyzed, interpreted, and presented.

In the past, police officers generally took their primary roles as first responders and keepers of the peace. Criminal investigation was only a limited component of those duties. Now, given the accessibility to a wide range of effective forensic tools, any police officer, regardless of their assignment, could find themselves presented with a scenario that requires some degree of investigative skill. The expectation of police investigators is that they be well-trained with the knowledge and skills to respond and investigate crime. These skills will include:

- Critical Incident Response
- Interpretation of criminal law and offence recognition
- Crime scene management
- Evidence identification and preservation
- Engaging forensic tools for evidence analysis
- Witness assessment and interviewing
- Suspect questioning and interrogation
- Case preparation and documentation
- Evidence presentation in court

In addition to these task skills of process and practice, investigators must also have strategic analytical thinking skills for risk assessment and effective incident response. They must have the ability to apply deductive, inductive, and quantitative reasoning to examine evidence and form reasonable grounds to identify and arrest suspects.

Engaging these higher-level thinking skills is the measure of expertise and professionalism for investigators. As our current justice system continues to change and evolve, it relies more and more on information technology and forensic science. With this evolution, the need for investigators to demonstrate higher levels of expertise will continue to grow.

Topic 4: The Path to Becoming an Investigator

For many people, their idea of what an investigator does is based on what they see, hear, and read in the media, movies, TV, and books. These depictions characterize personas ranging from dysfunctional violent rebels fighting for justice by their own rules, to by-the-book forensic investigators who get the job done clinically using advanced science and technology. Realistically, good investigation and real-life investigators are unlikely to make a captivating fictional script. Professional investigators and competent investigation rely on the tedious processes of fact-finding and sorting through evidence and information. It is about eliminating possibilities, validating events, and recording evidence, all the while engaging in an intentional process of thinking, analyzing, and strategically working towards predetermined goals; not to mention extensive note taking and report writing.

Sometimes, new police investigators are, at first, deluded by fictional representations, only to find out, by experience, that the real job, although having moments of action, satisfaction, and excitement, is more about hard work and deliberate attention to detail.

Another common misnomer about the job is the conception that investigation is the exclusive domain of a police officer. Although this may have been true in the earlier evolution of the investigative craft, it has become much less the case today. This change is a result of the enactment of many regulatory compliance statutes that require investigative knowledge, skills, and thinking. Compliance investigators maintain adherence to regulated activities which often involve legal compliance for industries where non-compliance can pose significant risks that threaten the lives and safety of people or the environment. These regulated activities are often responsibilities of the highest order. What starts as a regulatory violation can escalate into criminal conduct. The investigative skills of compliance investigators and inspectors must be capable of meeting the same tests of competency as the police.

Not just anyone can become an investigator. There are certain personal traits that tend to be found in good investigators. Among these traits are:

- Being passionate about following the facts to discover the truth, with a goal of contributing to the process of justice
- Being detail-oriented and observant of the facts and the timelines of events
- Being a flexible thinker, avoiding tunnel vision, and being capable of concurrently examining alternate theories while objectively using evidence as the measure to confirm or disconfirm validity of theories
- Being patient and capable of maintaining a long-term commitment to reaching a conclusion
- Being tenacious and not allowing setbacks and false leads to deter continued efforts
- Being knowledgeable and skilled at the tasks, process, and procedure while respecting legal authorities and the limitations to take action
- Being self-aware of bias and intuitive responses, and seeking evidence to support gut-feelings
- Being trained in the processes of critical thinking that provide reliable analysis of evidence that can later be described and articulated in reports and court testimony

Considering this list of traits, we can appreciate that good investigators are people with particular attitudes, aptitudes, and intentional thinking processes. These traits all form part of the investigative mindset. Although you cannot teach someone to be passionate about discovering the truth, anyone who has these traits can work towards developing and refining their other traits and skills to become an investigator. Developing the mindset is a learning journey, and the first step of this journey is to become intentionally aware of and engaged in your own thinking processes.

Toward this point, the investigator must always be mindful of the proposition of Shah and Oppenheimer (2008) in their book *Heuristics Made Easy: An Effort Reduction Framework*. Shah and Oppenheimer remind us that people have learned to become quick thinkers using mental short cuts, known as heuristics, in an effort to make decisions quickly and problem solve the challenges we encounter. They offer the proposition that heuristics reduce work in decision-making by giving the user the ability to scrutinize a few signals and/or alternative choices in decision-making, thus diminishing the work of retrieving and storing information in memory. This streamlines the decision-making process by reducing the amount of integrated information necessary in making the choice or passing judgment (Shah, 2008).

In this book, we will point out that these heuristic shortcuts are often instinctive or intuitive reactions, as opposed to well-reasoned, evidence-based responses. Although they may serve us well in our everyday thinking, they must be monitored and recognized for their shortfalls when we are required to investigate matters where the outcomes are critical.

To achieve the investigative mindset and be an objective investigator, it is important to be aware of the heuristic shortcuts and other negative investigative tendencies that can become obstacles to successful outcomes. For example, a good investigator needs to be focused on the objective of solving the case and making an arrest in a timely manner but becoming too focused can lead to “tunnel vision,” which is the single-minded focus on a favorite suspect or theory to the extent that other suspects or alternate theories are ignored. Moreover, a good investigator needs to take responsibility and be accountable for the outcomes of the investigation; however, taken to the extreme, this can lead to an investigator taking complete ownership of the investigation to the exclusion of allowing the ideas of others to provide guidance and influence. Finally, a good investigator needs to be careful about how much information is shared with others. However, excessive secrecy can inhibit information sharing with those who might contribute to the successful conclusion of the case.

Thinking as an objective investigator, it is often necessary to consider and evaluate several competing theories or possibilities of how a crime was committed and who the suspect may be. Often, new investigators, or those uninitiated to the objective mindset, will focus on a favorite theory of events or a favorite suspect, and rush to be first to reach the conclusion and to make the arrest. There is a trap in shortcuts and the focused rush to make a fast arrest. In this trap, other viable suspects and theories are too quickly ignored or discarded. This sometimes leads to investigations being derailed by “tunnel vision.” Worse yet, tunnel vision can lead to the misinterpretation of evidence, ultimately leading to charges against an innocent person, while the guilty remain undiscovered.

To summarize the observations made by Kim Rossmo (2009) in his book on criminal investigative failures, tunnel vision and lost objectivity have been part of the findings in many public inquiries. Commissioners at public inquiries have concluded that, at times, investigators relentlessly pursue a favorite suspect. Sometimes an alternate suspect should have been apparent, or exculpatory evidence was present that should have caused the investigators to stop and re-evaluate their favorite suspect, but tunnel vision had set in and the objective investigative mindset had been lost (Rossmo, 2009).

Similarly, and not totally unrelated to tunnel vision, other negative thinking responses also come into play, and can be observed in the behaviors of case ownership and excessive secrecy. It may seem that an investigator taking ownership for his or her investigation and maintaining some degree of secrecy in the management of case related information, is completely acceptable and perhaps even desirable. However, as happens with any human behavior, it can negatively influence the outcome of investigations. Information appropriately shared with the right people can often reveal connections that contribute to the evidence of a case, and investigators must remain open to this appropriate sharing. Many negative examples can be found where a police investigator, or even an investigative team, adopted the attitude that the conduct of an investigation is their own exclusive domain (Campbell, 1996). With that exclusive ownership, no one else is entitled or allowed to participate, and relevant information that needs to be shared with others can be jealously guarded. Opportunities are missed for other investigators to see details that could connect a similar fact pattern or make the connection to a viable suspect.

Topic 5: Understanding the Investigative Mindset


When we talk about the investigative mindset, in part, we are talking about the self-awareness and the organizational awareness to avoid negative outcomes. Once learned and practiced, this awareness can be a safety net against destructive investigative practices (i.e., tunnel vision, case ownership, and excessive secrecy). Criminal investigation can require complex thinking where the investigator must assess and determine the validity of information and evidence to guide the investigative process. This thinking strives to move from a position of mere suspicion to one of reasonable grounds for belief to make an arrest and ultimately articulate evidence upon which the court can make a finding of guilt beyond a reasonable doubt. This is a conscious process of gathering and recording information and thinking analytically to form reasonable grounds for belief supporting defensible actions of arrest and charges. From this conscious process, the investigator in court can articulate a mental map to describe how they derived their conclusions.

Sting Operations ^[93]

Another element of criminal investigation is the use of an undercover agent or decoy—the policeman who poses as a buyer of drugs from a street dealer or the elaborate “sting” operations in which ostensibly stolen goods are “sold” to underworld “fences.” Sometimes these methods are the only way by which certain kinds of crime can be rooted out and convictions secured.

But a rule against entrapment limits the legal ability of the police to play the role of criminals. The police are permitted to use such techniques to detect criminal activity; they are not permitted to do so to instigate crime. The distinction is usually made between a person who intends to commit a crime and one who does not. If the police provide the former with an opportunity to commit a criminal act—the sale of drugs to an undercover agent, for example—there is no defense of entrapment. But if the police knock on the door of one not known to be a drug user and persist in a demand that he purchase drugs from them, finally overcoming his will to resist, a conviction for purchase and possession of drugs can be overturned on the ground of entrapment.

Forensic Science ^[94]

	<p>Quotable</p> <p>“Knowledge of forensic tools and services provides the investigator with the ability to recognize and seize on evidence opportunities that would not otherwise be possible.”</p>
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Another critical element of investigation is forensic science. In this section, we examine various forensic sciences and the application of forensic sciences as practical tools to assist police in conducting investigations. This section is not intended to be a comprehensive dissertation of the forensic sciences available. Rather, it is intended to be an overview to demonstrate the broad range of forensic tools available. It is not necessary for an investigator to be an expert in any of the forensic sciences; however, it is important to have a sound understanding of forensic tools to call upon appropriate experts to deploy the correct tools when required. The forensic analysis topics covered in this section include:

1. Physical Matching

2. Fingerprint Matching
3. Hair and fiber analysis
4. Ballistic Analysis
5. Blood Spatter Analysis
6. DNA Analysis
7. Forensic Pathology
8. Chemical Analysis
9. Forensic Anthropology
10. Forensic Entomology
11. Forensic Odontology
12. Forensic Engineering
13. Criminal Profiling
14. Geographic Profiling
15. Forensic Data Analysis
16. Forensic Document Analysis
17. Forensic Identification Sections
18. Crime Detection Laboratories

Various types of physical evidence can be found at almost any crime scene. The types of evidence and where it is found can assist investigators to develop a sense of how the crime was committed. Tool marks where a door was forced open can indicate a point of entry, shoe prints can show a path of travel, and blood stains can indicate an area where conflict occurred. Each of these pieces of physical evidence is a valuable exhibit capable of providing general information about spatial relationships between objects, people, and events. In addition, the application of forensic examination and analysis could turn any of these exhibits into a potential means of solving the crime.

Topic 1: Physical Matching

If we think back to the example in Chapter 1 where the Bow Street Runners (McCrery, 2013) made a physical match from the torn edges of one piece of wadding paper to the original sheet from which it was torn, we can appreciate that physical matching is a forensic technique that can be applied, to some extent, by the investigator personally viewing and studying details of the evidence. At this level, physical matching can be used by investigators to do on site analysis of evidence. That said, the more sophisticated aspects of physical matching do require the expertise of a person trained in the techniques to form and articulate an opinion that the court will accept as expert evidence.

During a crime investigation, physical matching is typically conducted on items, such as fingerprints, shoe prints, tire prints, glove prints, tool impressions, broken glass, plastic fragments, and torn edges of items, such as paper, tape, or cloth. In these physical matchings, there are two levels of examination that are typically considered: an examination for class characteristics and an examination for accidental characteristics .

Level One — The Examination of the Item for Class Characteristics

Determining class characteristics takes place in relation to items, such as shoe prints, tire prints, glove prints, and tool impressions. At the first level of examination, these items can be classified and sorted based on type, make, model, size, and pattern. For example, if a shoe print is found at the scene of a crime and is determined to be a left shoe of a size 9, Nike brand, Air Jordan model, running type shoe with a wavy horizontal sole pattern, these class characteristics collectively provide a description of the suspect's shoe based on five defined descriptors.

In turn, these class characteristics may allow the investigators to narrow their focus to suspects having that class description of shoe. It is not a positive identification of the shoe to any particular suspect, but it does allow the potential elimination of suspects who wear different sizes, brands, and sole patterns of running shoe. Using this Level One examination, an investigator at the crime scene may find a suspect shoe print showing a distinct size and sole pattern. If a suspect with a matching size and sole pattern is found near the crime scene, this Level One observation would provide strong circumstantial evidence to assist in forming reasonable grounds to suspect that this person was involved in this crime.

A Level Two examination may be able to produce a conclusive match. Positive identification requires this next level of examination, namely the examination for accidental characteristics.

Level Two — Accidental Characteristics

Accidental characteristics are the unique marks and features that develop on any item resulting from wear and tear. Looking back at the Nike Air Jordan Running Shoe, to make a positive match of a suspect's shoe to the impression found at the crime scene, the crime scene impression would be examined for nicks, gouges, and wear patterns typically present on a worn shoe. These features would then be compared to a rolled impression of a suspect's shoe, and if the same nicks, gouges, and wear patterns could be shown in all the same locations on the suspect's shoe, a positive match could be made.

This Level Two method of comparison for things, such as shoes prints, tire prints, glove prints, and tool impressions, is the practice for physical matching. Investigators can often use these physical matchings to link the suspect back to the crime scene or the victim. Finding a suspect in possession of a shoe, a tire, or a tool that is a positive match to an impression at the criminal event is a powerful piece of circumstantial evidence.

With items, such as broken glass and plastic fragments, the process of physical matching requires significantly greater levels of expertise. At Level One, these items are first matched for general characteristics, such as material color and thickness; however, the process for making the comparison of broken edges requires microscopic examination and photographic overlay comparison of broken edge features to demonstrate a positive match. For investigators, these kinds of comparisons can be called upon where there is broken glass at a crime scene and fragments of glass have been found on a suspect's clothing, or in cases where glass or plastic fragments are left at the scene of a hit-and-run car crash and a suspect vehicle is found with damage that includes similarly broken items. Glass fracture analysis can also be used to demonstrate which side of a piece of glass received the impact that caused the fracture. This can be a helpful tool in confirming or challenging a version of events, such as insurance fraud, break-in reports, and motor vehicle crashes where the damage has been exaggerated or staged. Glass fracture analysis can also be used to demonstrate the sequence and order in which a series of bullets have passed through the glass of a window. This can be helpful for an investigator to establish the origin location of the shooter, and, in cases of a drive-by shooting, the direction of travel.

Topic 2: Fingerprint Matching

The forensic science of fingerprints has a longstanding history in policing. Fingerprints have been accepted as being individually unique to each person. The courts frequently accept positive fingerprint matches conducted by an expert witness, as proof of identity beyond a reasonable doubt (Jain, 2010).

Prior to the modern advent of DNA analysis and biometric scanning technologies for positive identification, fingerprints and dental record x-rays were the only truly positive means of making a conclusive identification.

Fingerprints are unique patterns of lines and ridges that exist on the areas of our hands and fingertips, known as the plantar surfaces. These unique patterns have been classified in categories and features since the late 1800's (Dass, 2016). The various categories and features allow each digit of a person's fingers to be catalogued in a searchable system or database. These unique categories and features do not change throughout a person's life, unless they are subjected to damage through physical injury or intentional abrasion. The impressions of our fingerprints are often left on items we touch because the oils our bodies produce act like an invisible ink adhering to smooth surfaces we touch, thus transferring these fingerprint impressions to those surfaces. These virtually invisible image transfers are commonly called latent fingerprints, and they are easily made visible on most surfaces through the application of colored fingerprinting powder that adheres to the oils left by our fingers. The powder sticking to the oil reveals the image of lines and ridges that make up the fingerprint. It is also possible for a fingerprint impression to be exposed on surfaces, such as plastic, dry paper, or paint through a process of chemical fuming that reacts with the oils of the fingerprint changing their color, thereby exposing the image. Fingerprints are sometimes also visible when they are transferred to an object because the finger has some foreign material on it, such as ink or blood. Other forms of visible fingerprints can be found as an actual molded impression of the fingerprint when a person touches a malleable surface, such as clay or cheese.

The unique lines and ridges of an unknown fingerprint can be searched in a database of known criminal fingerprints for identification. Today, this type of search is done electronically using a biometric scanning process known as Automated Fingerprint Identification System (AFIS). For smaller partial prints, identification of a suspect requires sorting through possible suspects and conducting specific searches of print characteristics to make a match. If the person who left the print does not have a criminal record or their fingerprints are not on file, the only way a comparison can be made is to obtain a set of fingerprint impressions from that person. When this is done, the print examination will be conducted by a trained fingerprint expert who will search the print to establish as many points of comparison between the suspect print and the known-print as possible. The general accepted standard for accepting a match is to find ten points of comparison.

The location and identification of a suspect's fingerprint at the scene of a crime, or on some crime-related object, is strong circumstantial evidence from which the court can draw the inference that the suspect is, in some way, connected to the crime. The

investigative challenge of finding a suspect's print is to eliminate other possible ways that the print may have been left at the scene, other than through involvement in the crime.

Topic 3: Hair and Fiber Analysis

In considering once again "Locard's Theory of Evidence Transfer," (Petherick, 2010) it was suggested that a person cannot be at the scene of a crime without leaving something behind and cannot leave the scene of a crime without taking something with them. Exhibits of hair and fiber fit support this theory well. As humans, we are constantly shedding materials from our bodies and our clothing. We enter a room, and we leave behind strands of hair that fall from our heads, oily impressing of our fingerprints as we touch objects, and fibers of our clothing materials. As we leave a room, we take away hairs from other occupants of the room or fibers from the carpet and furniture adhering to our clothing. The analysis of hair and fiber, although not an exact science, can provide corroborative evidence. Hair samples can be compared taking a shed sample at the crime scene to the hair from a suspect to establish a similarity within a limited degree of certainty. If the hair happens to have been pulled out and still has root tissue, there is a possibility for more positive identification using DNA analysis. Somewhat more identifiable than hair samples, fiber samples can often be narrowed down to make a higher probability comparison using microscopic examination for size, color, and type between an unknown sample and control sample.

Topic 4: Ballistic Analysis

Given the number of gun-related crimes, the understanding of ballistic analysis is important for investigators. Ballistics is the study of all things that are launched into flight, how they are launched, and how they fly. In most cases, investigators find themselves dealing with several common types of firearms.

1. Handguns as either semi-automatic pistols or revolvers
2. Long rifles that are single shot bolt action, automatic, or semi-automatic
3. Shotguns that are breach loading or chambered pump action

There are techniques in ballistic science that address the unique aspects of firearms and bullets. Because ballistic comparisons seek to determine if a particular gun was the originating source of an unknown bullet or cartridge casing, this examination process is sometimes referred to as ballistic fingerprinting. If a particular gun touched a particular bullet or cartridge-casing, it leaves behind some unique identifiable marks, or a ballistic fingerprint.

Ballistic Fingerprints

When a modern-day firearm is being loaded to fire, the cartridge loaded into the gun is composed of several components. The bullet portion of the cartridge is tightly pressed into a brass tube, called the casing. At the bottom of this brass casing is a round, flat base slightly larger than the casing, and this base prevents the casing from sliding completely into the cartridge chamber of the gun when being loaded. On the bottom of this flat base of the cartridge is the primer. When the trigger is pulled, the primer is the portion of the cartridge that will be struck by the firing pin of the gun. When struck, the primer ignites the gun powder contained inside the brass casing with an explosion that causes the bullet to leave the casing, travel down the gun barrel, and exit the gun.

Each of the components of the cartridge casing can be examined forensically and comparisons can be made to suspect guns. In some instances, it is possible to determine if a cartridge has been fired from the chamber of a specific gun. This can be done by examining the unique and identifiable marks left by four aforementioned components of the gun. Like the process of physical matching, this is also a two-level process.

At Level One, cartridges are classified by the caliber, which is the size of the bullet, the maker of the cartridge, and the primer location; either a center-fire or a rim-fire cartridge on the cartridge base.

For ballistic purposes, guns are classified by their caliber, chambering and ejector mechanisms, and firing pin, namely either center-fire or rim-fire. Eliminations of suspect weapons can often be made at Level One. For instance, a .38 caliber bullet removed from a crime scene cannot have been fired from a .22 caliber weapon. Or, that same .38 caliber bullet showing marks from an ejector mechanism could not have been fired from a .38 caliber revolver that does not have an ejector mechanism.

At Level Two, the more decisive ballistic fingerprint comparisons are often made using the following methods:

1. Striations Matching
2. Chamber Markings
3. Firing-Pin Comparison
4. Ejector markings

1. **Striations Matching.** Bullets fired from either a handgun or long rifle, other than a shotgun, fire a single projectile each time. This fired projectile is a lead or lead-composite bullet. When fired, this bullet travels down the barrel of the gun and begins to spin because the inside of the gun barrel has been intentionally machined with long gently turning grooves, called rifling. These grooves catch the soft-lead sides of the bullet spinning it like a football, and this spinning makes the bullet travel straighter and truer to the target. As a result of these grooves designed into gun barrels, every bullet fired will arrive at its target with markings etched into the bullet material from contact with the grooves in the barrel. These etched markings are called striations, and they are uniquely identifiable back to the gun they were fired from. For an investigator, these striations create an opportunity to match the bullet to the gun that fired it. Recovered bullets can be recovered and compared to test bullets fired from a suspected gun. When striations of a recovered bullet are compared to known samples fired from a suspected gun, a side-by-side microscopic technique is used to match striation markings. An expert ballistic examiner can sometimes identify and illustrate matches in the striations to make a positive match.
2. **Cartridge Chamber Markings.** When a cartridge is loaded into the chamber of a gun, the shiny brass casing comes into contact with the hard steel sides of the chamber. This chambering of the cartridge can leave unique and identifiable scratch marks on the side of the casing. A cartridge casing ejected or unloaded from a weapon and left at the crime scene can sometimes be matched to the suspect gun by comparing these markings.
3. **Firing Pin Comparison.** When the firing pin of any gun strikes the primer on the bottom of a cartridge, it leaves an indentation mark. This firing pin indentation can sometimes be matched to the firing pin of a suspect weapon. This requires microscopic examination that looks for the unique characteristics of the firing pin that become impressed into the soft metal of the primer when the firing contact happens.
4. **Ejector Mechanism Markings.** Methods for loading and unloading weapons have evolved considerably due to different gun designs. The simplest guns allow the user to open the breach of the gun exposing the cartridge chamber to manually insert the cartridge and close the breach to make ready for firing. There is no ejector mechanism for these guns, so there will be no ejector marks left on the base of a cartridge when it is unloaded from the weapon. Other guns have a variety of different ejector methods, including ejectors that catch the base of the cartridge casing to physically pull it from the breach and eject them away from the gun. In cases where a gun does have an ejector mechanism, these mechanisms leave very distinct and unique marks on the soft brass cartridge base. These markings can sometimes be compared and matched back to the ejector of a suspect weapon. With this broad variety of ballistic comparison techniques, an investigator has a significant number of tools that can be deployed and strategies that can be engaged to assist in matching a bullet to the gun that fired it. Considering these tools, the cartridge casing left at the scene of a shooting can be as important as a bullet removed from the body of a shooting victim. An investigator needs to keep this in mind when seizing cartridge casings as evidence. Great care needs to be exercised to document the location where each individual casing was found, and to preserve each casing in a manner that does not degrade the possible markings that could enable a match to be made. Damage can be done by placing casings into a common bag where they can rub against each other causing more characteristics and obliterating existing marks.

Trajectory Analysis

In addition to the ballistic fingerprinting examinations, another area of ballistic science is known as trajectory analysis. The trajectory of a bullet is the path it travels from the time it leaves the barrel of the gun to the point where it finally loses the propulsion energy of the gunpowder and comes to rest. The flight of a bullet can be very short, as in the case of a point blank shooting, where a victim is shot at very close range, or it can be very distant where the target is one mile away or more, as in the case in some sniper shootings.

When the bullet is travelling a longer distance, it travels that distance in an arched path or trajectory of travel as it is pulled towards the ground by gravity. When the bullet arrives at its destination, it will have a distinct angle of entry into the target. This angle of entry can sometimes be calculated as trajectory to estimate the geographic location of the originating shot. In cases where a bullet passes through several objects, such as two walls of a house, the trajectory of the bullet can be used to determine where the shooter was located. In cases of drive-by shootings, for example, where several shots are fired, the pattern of trajectories can show if the shooter was moving and, if so, demonstrate the direction of travel.

Topic 5: Blood Spatter Analysis

Blood spatter analysis, also known as blood stain pattern analysis, is a relatively new forensic specialty. The purpose of this analysis is to determine the events of a crime where blood has been shed. This is accomplished through the careful examination of how blood is distributed inside the crime scene. Studies have shown that when blood is released during an attack, certain patterns of distribution can be expected (National Science Forensic Technology Center, 2012). For instance, a person being struck with a baseball bat will begin to bleed, and blood will be distributed in a droplet spatter pattern in the direction of the strike behind the

victim. These droplets of blood will have a direction of travel that will be indicated by the directional slide of each droplet as the bat hits objects in its path. Blood from the victim adhering to the bat can also be distributed when the bat is on the upstroke for the next strike. This blood will be distributed in an upward directional slide pattern, for example, up a wall, onto a ceiling, or behind the attacker. Calculations of how many strikes were made may become evident from the tracking of multiple streams of droplets behind the victim and behind the attacker. Given this developing science, blood spatter analysis can be useful in criminal event reconstruction.

Topic 6: DNA Analysis

DNA, or deoxyribonucleic acid, is a molecule that holds the genetic blueprint used in the development, functioning, and reproduction of all living organisms. As such, it carries the unique genetic information and hereditary characteristics of the cells from which living organism are formed. Except for identical twins, the DNA profile of each living organism is unique and distinct from other organisms of the same species. There are some rare cases where one person may carry two distinct types of DNA, known as Chimera (Rogers, 2016) where paternal twin embryo merge during gestation, or in cases where a bone marrow transplant enables the production of the marrow donor DNA in the recipient's blood. In these rare cases, a person may test for two distinct DNA profiles for different parts of their body.

In human beings, DNA comparison can enable high probability matches to be made between discarded bodily substances and the person from whom those substances originated. Bodily substances containing cellular material, such as blood, semen, seminal fluid, saliva, skin, and even hair root tissue can often be compared and matched back to its original owner with high statistical probabilities of comparison (Lindsey, 2003). Sometimes, even very old bodily substances, such as dried blood, dried saliva, or seminal stains, can be analyzed for a DNA profile. The introduction of DNA analysis has allowed investigators for advocates to re-examine historical evidence and exonerate persons wrongfully convicted and imprisoned for criminal offences (Macrae, 2015).

DNA is a very powerful tool for investigators and can be considered anytime discarded bodily material is found at a crime scene. Even very small amounts of material can yield enough material for DNA comparison. Importantly, DNA databanks of known criminals and unsolved crimes are now becoming well established in North America (Royal Canadian Mounted Police, 2006). When a person is convicted of certain criminal offences, DNA is collected and submitted to these databases.

Topic 7: Forensic Pathology

Forensic Pathology is the process of determining the cause of death by examining the dead body during an autopsy. An autopsy generally takes place in the pathology department of a hospital. In the case of a suspicious death or a confirmed homicide, police investigators will be present at an autopsy to gather information, take photographs, and seize exhibits of a non-medical nature, such as clothing, bullet fragments, and items that might identify the body. These items would include personal documents, fingerprints, and DNA samples.

During an autopsy, a forensic pathologist dissects the body carefully examining, documenting, and analyzing the body parts to determine the cause of death. In the first stage of an autopsy, the pathologist examines the body for external injuries and indicators of trauma that may provide a cause of death. In this first stage of examination, the pathologist will make an estimate of the time-of-death by observing evidence of four common post-mortem (after-death) indicators. These are body temperature, the degree of rigor mortis, post-mortem lividity, and progress of decomposition.

Body Temperature

Algor Mortis is the scientific name given to the loss of body temperature after death which can sometimes be used to estimate the time of death (Guharaj, 2003). This is a viable technique in cases where the body is being examined within 24 hours following death. This method of estimating time of death can vary significantly dependent upon many possible variables, such as:

- Ambient room temperature being within a normal range of approximately 22° Celsius
- Pre-death body temperature of the victim not being elevated by illness or exertion
- Thickness of clothing that might insulate the body temperature escape
- The temperature and conductivity of the surface the body was located on that could artificially increase or decrease temperature loss

Considering a normal body temperature of 37° Celsius at the time of death, it can be estimated that the body will cool at a rate of 1° – 1.5° Celsius per hour. This calculation is known as the Glaister Equation (De Saram, Webster, and Kathirgamatamby, 1956). So, taking an internal rectal temperature and subtracting that from 37° Celsius will provide an estimate of the number of hours that

have passed since the time of death. For example, a dead body with a measured temperature of 34° Celsius would provide a time range of 3 to 4.5 hours since the time of death.

Rigor Mortis

Rigor mortis is a term used to describe the stiffening of the body muscles after death. A dead body will go from a flaccid or limp muscle condition to one where all the muscles become contracted and stiff causing the entire body to become constricted into a fixed position. After being in a constricted and fixed position, the muscles eventually become flaccid again (Advameg, Inc., 2017). In normal room temperatures, this stiffening of muscles and the relaxing again has a predictable time progression of approximately 36 hours. In this progression, the stiffening of muscles will take approximately 12 hours, the body will remain stiff for 12 hours and will progressively become flaccid again over the next 12 hours.

Stiffening of muscles begins with the small muscles of the hands and face during the first 2 to 6 hours, and then progresses into the larger muscle groups of the torso, arms, and legs over the next 6 to 12 hours. These are general rules; however, the rate of rigor mortis can be different for infants, persons with extreme muscle development, or where extensive muscle activity precedes death, such as a violent struggle (Cox, 2015).

In determining the time of death in average environmental temperatures, Cox (2015) recommended that:

1. If the body feels warm and is flaccid, it has been dead for less than 3 hours
2. If the body feels warm and is stiff, it has been dead for 3 to 8 hours
3. If the body feels cold and stiff, it has been dead for 8 to 36 hours
4. If the body feels cold and is flaccid, it has been dead more than 36 hours

Post-Mortem Lividity

Post-mortem lividity refers to a discoloration or staining of the skin of a dead body as the blood cells settle to the lowest part of the body due to gravity. This discoloration will occur across the entire lower side of a body; however, in places where parts of the body are in contact with the floor or another solid object, the flesh compresses and staining will not occur in that area. The staining is a reddish-purple coloring, and it starts to become visible within 1 hour of death and becomes more pronounced within 4 hours. Within the first 4 hours, lividity stains are not fixed and, if the body is moved, the blood products will shift and stain the part of the body that has become lower. In most cases, these stains become fixed between 12 and 24 hours. As such, they can be viewed as an indicator of how the body was left at the time of death. Importantly, if a body is found with post-mortem lividity stains not at the lowest point in the body, it can be concluded that the body has been moved or repositioned after the 12-to-24-hour stain setting period (Cox, 2015).

Decomposition

This is the final indicator a pathologist can look at to estimate the time of death. Sometimes, dead bodies are not discovered in time to use body temperature, rigor mortis, or early lividity indicators to estimate a more exact time of death. In these cases, assessing the progress of decomposition becomes important. Decomposition starts as soon as the body ceases to be alive. Subject to environmental conditions of extreme heat or cold, the readable signs of decomposition will become apparent 36 to 48 hours after death (EnkiVillage, 2017). These signs include bloating of the body and a marbling discoloration of the skin in a spider web pattern along surface blood vessels. As the body continues to decay, the skin surface will open, and body fluids will begin to seep out. In advanced stages of decomposition, the body is often no longer identifiable by facial recognition, and DNA testing or dental records become the tools to determine identity. At very advanced stages of decomposition, flies and maggots begin to emerge, and the number of life cycles of the maggot-to-fly can be estimated by a forensic entomologist to provide the amount of time that has passed since these insect life cycles began.

Once these preliminary examinations have been made, the pathologist will cut the corpse open to conduct a detailed internal examination of each organ to look for signs of trauma, disease, or external indicators that might explain the cause of death, such as water in lungs or toxins in blood.

Causes of Death

There are a wide range of possible causes of death and pathologists are trained to look for these indicators, gather the evidence, and develop an expert opinion regarding the cause of death. Causes of death can include:

- Laceration or Stabbing
- Shooting

- Blunt force trauma
- Asphyxiation
- Toxic substances
- Electrocution
- Depriving necessities of life

In cases of laceration or stabbing, wounds are inflicted by a sharp weapon or pointed object. The pathologist will attempt to determine if the death was caused by damaging a vital organ or by blood loss. The distinction here is that a person may be cut or stabbed in a way that causes them to bleed to death, which will be indicated to the pathologist by only a small amount of blood remaining in the body. Alternately, a laceration or stab wound may penetrate the heart, lungs, or the brain in a way that causes the organ to stop functioning and causes death. In these cases, the pathologist will make a determination and render an opinion of fatal organ damage.

In cases of stabbing, the pathologist can sometimes illustrate the entry point of the wound and trace the wound path to determine an angle of entry indicating how the stab wound was inflicted. The size, depth, and width of the wound may indicate the size and type of weapon used to create the injury. Similarly, examining the characteristics of the wound can provide information to allow the pathologist to offer an expert opinion on the direction of a laceration or cut wound by illustrating the start point and the termination point. This information can be helpful for investigators in reconstructing or confirming the actual actions and weapons used in a criminal event.

In cases of shooting, the pathologist will make a determination of whether death was caused by the fatal destruction of a vital organ or by blood loss. Recovery of a bullet or fragments of a bullet from inside the body can be helpful in ballistic analysis. Examining the entry wound can sometimes indicate the distance from which the wound was inflicted. In cases of point blank or direct contact shootings, gunshot (burned gun powder) residue will be present at the entry point of the wound. As with stab wounds, the pathway that the bullet travelled from the entry point into the body to where it came to rest can sometimes be identified by a pathologist to determine the angle of entry. For investigators, this information can be helpful in reconstructing the criminal event and determining the location of the shooter. In cases of self-inflicted gunshot wounds, a point blank entry point and a bullet path indicating a logical weapon position in the hand of the victim can provide some confirmation or contradiction of the self-inflicted wound theory.

In cases of blunt force trauma, the pathologist will look for indications of organ destruction or massive internal bleeding causing death. Blunt force trauma can be inflicted in many ways, such as massive sudden trauma from a fall from a great height, or a high-speed car crash that can immediately damage the brain, the heart, or the lungs to the point where they cease to function resulting in death. Other blunt force traumas, such as a strike to the head with a weapon, may not immediately cause death, but result in massive bleeding and internal accumulation of blood that can cause death. In cases of head injuries pathologists will sometimes be able to determine the contact point where the injuries were inflicted, and they will be able to point to the contre coupe injury effect, which happens when the head is struck on one side and the brain is so traumatically moved inside the skull that it also become damaged on the opposite side and bleeding occurs at the top of the brain. This bleeding inside the skull can sometimes cause death.

In a similar effect, Shaken Baby Syndrome (SBS), (Elsevier, 2016) occurs when an infant child is violently shaken by a person and the baby's brain moves back and forth traumatically inside the skull causing bruising and sometimes fatal bleeding at the front and back of the brain. An examination by the pathologist for the contact points and internal bleeding can provide valuable clues to the manner in which the blunt force trauma was inflicted. According to An Investigator's Manual for Shaken Baby Syndrome, studies indicate that SBS is the leading cause of death in children under two years of age and research studies the United Kingdom and the United States indicate that SBS may occur each year in as many as 24 to 30 per 100,000 children under two years of age (Smith, 2010).

In cases of asphyxiation, a pathologist will look for indicators of how the body was deprived of oxygen. Several common means include strangulation, suffocation, smoke inhalation, or drowning. For strangulation, the pathologist will look for bruising around the neck inflicted by choking hands or by a ligature. A ligature is any item, such as a rope or a belt, which could be used to restrict breathing and stop oxygenated blood going to the brain, thus causing death. If a ligature has been used and removed, it will leave a distinct abrasion line. If a dead body is found with a ligature in place, investigators should take great care to not untie the ligature, but cut it off of the victim, as this allows the ligature size to be measured and compared to the size of the neck to determine the amount of breathing that was restricted. Once the ligature is removed from a dead body, a distinct ligature mark or a groove in the flesh will sometimes be visible.

To determine strangulation, the pathologist will examine the eyes of the victim for the presence of small, ruptured blood vessel that appear as red spots on the white of the eyeball. These spots are known as petechial hemorrhage and will often be visible in victims

of strangulation (Jaffe, 1994).

Suffocation as a cause of asphyxiation occurs when a victim's breathing is stopped by an object, such as a pillow or a plastic bag, which restricts the ability of a victim to breathe, thus causing death. Unlike strangulation, suffocation has fewer indicators of violent trauma. Suffocation deaths are sometimes accidental and are harder for pathologists to conclusively determine. The presence of a suffocation device at the scene of the death is sometimes a first clue to this cause. Other contributing causes can be the limited ability of a victim to remove the device that accidentally obstructs their breathing, as may be found with a very young child, a handicapped person, or a frail elderly victim.

Another unique type of asphyxiation death is Auto Erotic Asphyxia (AEA). This occurs when a person is attempting to enhance their sexual arousal or pleasure while masturbating and apply self-strangulation with a ligature device. Their goal in AEA is not suicide but rather to reach a state of extreme oxygen deprivation and euphoria at the time of orgasm. This strategy can go wrong when the individual passes out and their ligature does not release causing continued strangulation and death. These cases can resemble suicide; however, they are really death by misadventure because the victim had no intent to kill themselves. AEA can sometimes be distinguished from suicide by the existence of apparent masturbation, pornography at the scene, and ligature devices that have releasable controls.

In cases where asphyxiation is caused by smoke inhalation, a pathologist can find signs of soot blackening in the lungs and, if the air containing the smoke was sufficiently hot, the lungs will also show signs of burn trauma. Because arson is sometimes used as a means of disguising a homicide, finding a dead body in a burning building, and not finding signs of smoke in the lungs, is a red flag for possible death by homicide.

In cases where asphyxiation is caused by drowning, a pathologist will find signs of water present in the lungs. If there is a question as to the location of the drowning, it is possible to have a diatom test conducted on the victim's tissue. If the victim was drowned in fresh water, the diatom material, which is microscopic algae, will have migrated from the water in the lungs to the blood and tissue of the victim. These microscopic algae are species unique to a particular body of water. Diatom material found in a victim's lungs should match the diatom sample from the water where the body was found. If it does not match, this suggests that the victim drowned elsewhere.

In cases of toxic substances, a pathologist will test the stomach contents, the blood, eye fluid known as vitreous humor, and tissue samples from various organs in the body for poisons, drug overdose, the ingestion of toxic chemicals, or toxic gas inhalation. Any of these substances can cause death if ingested or inhaled in sufficient quantities.

In cases of electrocution, a person dies because of an electrical current passing through their body that stops the heart. A pathologist will look for signs to confirm that a current passed through the body, including contact burns where a person has touched a source of power that entered their body and existed to a grounding point. This grounding point is often at the ground through the feet, but can be through a shorter contact pathway, if another hand or part of the body was in contact with a grounded object. Burns will also be visible where the electrical current exited the body.

Cases where the necessities of life have been deprived generally occur where there is a dependent relationship between a caregiver and a victim. The victims in these cases are typically very young or very elderly persons who are unable to take care of their own needs. These cases often take place over an extended period of time and may include other types of physical neglect or abuse. Failing to provide necessities of life is such a significant issue that the Criminal law in Canada makes provision for this as an offence.

Duty of persons to provide necessities²¹⁵

1. Everyone is under a legal duty

1. as a parent, foster parent, guardian or head of a family, to provide necessities of life for a child under the age of sixteen years;
2. to provide necessities of life to their spouse or common-law partner; and
3. to provide necessities of life to a person under his charge if that person
 1. is unable, by reason of detention, age, illness, mental disorder or other cause, to withdraw himself from that charge, and
 2. is unable to provide himself with necessities of life.

Marginal note: Offence

2. Everyone commits an offence who, being under a legal duty within the meaning of subsection (1), fails without lawful excuse, the proof of which lies on him, to perform that duty, if

1. with respect to a duty imposed by paragraph (1)(a) or (b),
 1. the person to whom the duty is owed is in destitute or necessitous circumstances, or
 2. the failure to perform the duty endangers the life of the person to whom the duty is owed, or causes or is likely to cause the health of that person to be endangered permanently; or

with respect to a duty imposed by paragraph (1)(c), the failure to perform the duty endangers the life of the person to whom the duty is owed or causes or is likely to cause the health of that person to be injured permanently. (Justice Laws Canada, 2017)

Marginal note: Punishment

3. Everyone who commits an offence under subsection (2)
 1. is guilty of an indictable offence and liable to imprisonment for a term not exceeding five years; or
 2. is guilty of an offence punishable on summary conviction and liable to imprisonment for a term not exceeding eighteen months.(Justice Laws Canada, 2017)

If the death of a person is found to be the result of failing to provide the necessities of life, the responsible caregiver can ultimately be charged with criminal negligence causing death.

Topic 8: Chemical Analysis

There are a wide range of chemicals and usages that can be used in the commission of a crime or found at the scene of a crime. In addition to general chemical analysis, there are several sub-areas for analysis in cases of:

- Accelerants used in the crime of arson;
- Explosive analysis in cases of conventional crimes and terrorism;
- Toxic chemicals and biological agents used in cases of murder, industrial negligence, and terrorism;
- Drug analysis in the cases of trafficking and drug overdoses;
- Gunshot residue analysis; and
- Analysis and chemical matching of paint transfer in cases of hit and run motor vehicle crashes.

Topic 9: Forensic Archaeology

Relatively new in the forensic world, forensic archaeology is the use of archaeological methods by experts to exhume crimes scenes, including bodies. These forensic experts are trained to methodically excavate and record their dig. They document the recovery of artifacts (evidence), such as human remains, weapons, and other buried items, that may be relevant to the criminal event. Forensic archaeologists will often work in concert with other forensic experts in DNA, physical matching, forensic entomology, and forensic odontology in the examination of evidence.

Topic 10: Forensic Entomology

Forensic entomology is a very narrow field of forensic science that focuses on the life cycle of bugs. When a dead body has been left out in the elements and allowed to decompose, the investigative challenge is not only to identify the body, but to establish the time of death. Once a body has decomposed, the process of determining time of death can be aided by a forensic entomologist. As discussed in a previous chapter, these experts look at the bugs that live on a decomposing body through the various stages of their life cycle. From these life-cycle calculations, scientists are sometimes able to offer and estimate relative time of death.

Topic 11: Forensic Odontology

To paraphrase the description provided by Dr. Leung (2008), forensic odontology is essentially forensic dentistry and includes the expert analysis of various aspects of teeth for the purposes of investigation. Since the advent of dental x-rays, dental records have been used as a reliable source of comparison data to confirm the identity of bodies that were otherwise too damaged or too decomposed to identify through other means. The development of DNA and the ability to use DNA in the identification of badly decomposed human remains has made identity through dental records less critical. That said, even in a badly decomposed or damaged corpse, teeth can retain DNA material inside the tooth, allowing it to remain a viable source of post-mortem DNA evidence (Gaytmenn, 2003).

Beyond the identification of dead bodies, forensic odontology can sometimes also provide investigators with assistance in confirming the possible identity of a suspect responsible for a bite mark. This comparison is done by the examination and photographic preservation of the bite mark on a victim or an object, and the subsequent matching of the details in that bite mark configuration to a dental mold showing the bite configuration of a known suspect's teeth. Although bite mark comparison has been

in practice for over fifty years there remain questions to the reliability for exact matching of an unknown bite mark to a suspect (Giannelli, 2007).

Topic 12: Forensic Engineering

Forensic engineering is a type of investigative engineering that examines materials, structures, and mechanical devices to answer a wide range of questions. Often used in cases of car crashes, forensic engineers can often estimate the speed of a vehicle by examining the extent of damage to a vehicle. They can also match damage between vehicles and road surface to determine the point of impact and speed at the time of impact. Many police agencies now have specialized traffic personnel trained in accident analysis and accident reconstruction. These officers utilize a variety of forensic engineering techniques to examine and document the dynamics of car crashes to establish how and why a crash occurred.

In cases of building collapses, forensic engineers can conduct analyzes to determine the cause of a structural failure and, in the case of an intention explosion, such as in acts of terrorism, this can point to the location of the planted explosive device. The investigative possibilities for forensic engineering are too extensive to elaborate here, but if damage to a building, an object, or a piece of equipment poses an investigative question, the tools of forensic engineering should be used to seek answers.

Topic 13: Criminal Profiling

Criminal profiling, also referred to as psychological profiling, is the study of criminal conduct to develop the most likely social and psychological profile of the person who may have committed the crime based on the actions of known criminals who have committed that same type of crime in the past (Royal Canadian Mounted Police, 2015). Criminal profiling draws on information from many sources, including historical criminal statistics of known criminals. Additionally, other information is collected about violent criminals and their modus operandi. This kind of information can shed light on details, such as preferences for luring victims, taking trophies, abduction methods, bondage preference, torture methods, means of killing, and displaying a dead body after death. With information and specific data collected from a wide assortment of offenders, psychological profilers work with investigators to examine the details of a criminal investigation, and, based upon the known historical criminal conduct data, they determine probable descriptors and characteristics that might be expected in a current suspect's profile.

For investigators, this kind of profiling can be helpful in focusing the investigation on the most likely persons. As an extension of these profiling techniques, a database known as Violent Crime Linkage Analysis System (ViCLAS) has been in place in Canada since the 1990s. This system documents the criminal conduct of convicted violent offenders and sex offenders, as well as certain unsolved cases, with a goal of documenting crime types and criminal conduct into a searchable database where unsolved crimes can be linked to offenders with matching profiles. According to the ViCLAS system web page, "Since the implementation of ViCLAS across the country, the database continues to swell with cases. As of April 2007, there were approximately 300,000 cases on the system and over 3,200 linkages have been made thus far" (Royal Canadian Mounted Police, 2015). Criminal profiling provides a valuable tool for sorting and prioritizing suspects identified for further investigation. In some cases, a new suspect may even be identified through the existing data within the ViCLAS database.

Topic 14: Geographic Profiling

Geographic profiling is similar to psychological profiling in that it seeks to focus on the possible conduct of an unknown criminal based on the data collected from the known past criminal conduct of others. Unlike psychological profiling, geographic profiling is focused specifically on where a suspect might reside relative to the location where his or her crimes are currently being committed.

In the late 1980's, police Detective Inspector Kim Rossmo developed a mathematical formula that began the evolution in the new forensic science of geographic profiling. Dr. Rossmo validated his mathematical formula from his observation that criminals generally seemed to live within an identifiable proximity to the chosen locations where they committed their crimes (Rossmo, 1987). Applying this method, when a criminal is suspected of committing a series of offences, it is possible to have the locations of those offences examined by a geographic profiler to estimate where that suspect most likely resides. This assessment can be helpful in searching for and identifying new suspects by prioritizing suspects based on the location of their residence relative to the identified area with the highest probability for a suspect to be found.

Topic 15: Forensic Data Analysis

In today's digital world, criminal conduct frequently includes evidence in the form of digital data. The collection of data from cellular phones as proof of a criminal conspiracy, or the message tracking of images passed in the distribution of child pornography, all require significant levels of specialized technological knowledge to collect, preserve, and analyze the exhibits. Some crimes, such as identity theft and the subsequent fraudulent misappropriation of funds, are almost entirely digital data crimes, and they

cross over several fields of technological expertise. It is now incumbent upon ordinary investigators to understand the basics of how to preserve digital evidence, and to know when and if digital evidence may be present. An ordinary investigator without forensic data skills and qualifications should never attempt to recover digital data evidence without help. The destruction of evidence would be like an untrained investigator trying to lift fingerprints at a crime scene.

Topic 16: Forensic Document Analysis

Forensic document analysis is typically done by certified forensic document examiners working as independent contractors or as employees within the service of government funded crime detection laboratories. Most often tasked within the scope of fraud investigations, these specialists examine items, such as wills, land titles, contracts, deeds, seals, stamps, bank checks, identification cards, handwritten documents and documents from photocopiers, fax machines, and printers. These documents are often examined to authenticate them as genuine or unaltered original documents where an allegation of misrepresentation or fraud has been made. Original signatures are also sometimes called into question, and these examiners can make a determination of authenticity by comparing the signature sample to samples known to be genuine. Forensic experts are also called upon to analyze threatening letters, ransom letters, or hold-up notes to make a connection to an identified suspect.

Topic 17: Forensic Identification Sections

Forensic identification sections are the frontline forensic specialists typically working within their own police agency. Usually, these specialists are experienced police officers who have taken forensic training in photography, fingerprint examination, physical matching, evidence collection, and crime scene management to work within this type of section. The daily work of forensic identification sections involves attending crime scenes and conducting a variety of examinations using special fingerprint dusts, chemical fuming agents, and ultraviolet light sources to uncover impressions of fingerprint, shoeprints, tool marks or even body fluid stains not visible to the naked eye. Once the stain or the image of a forensic impression is found, these specialists can record, preserve, and recover the exhibit using photography and specialized tools for lifting the exhibit from a surface or removing the entire imprinted surface as an exhibit.

Topic 18: Crime Detection Laboratories

Crime Detection Laboratories, such as the RCMP labs across Canada, provide a range of specialties, including;

- Biology — Comparison of the suspect's and victim's body fluids and hair; most often DNA analysis
- Chemistry — Identifying non-biological substances found at a crime scene, such as paint, glass, liquids, fuels, and explosive substances
- Toxicology — The examination of body fluids to determine the level of alcohol present in the body, and providing expert opinions in relation to the extent of intoxication
- Documents Examination — The analysis of documents to determine authenticity for fraud allegations. Can also provide handwriting comparison
- Firearms Ballistics — Matching shells, casing, and fired bullets to a weapon and making a determination of bullet trajectory
- Tool mark examination — Matching tool impressions to an originating suspect tool

Scientists hired to work in these crime detection laboratories require a four-year specialized degree in the field of their choice. Once hired, they undergo an understudy period of 12 to 18 months in a laboratory with an expectation that they will become proficient enough in their chosen field to achieve expert qualification from the court. This expert status will allow them, on a case-by-case basis, to render expert opinion evidence on their examination of forensic exhibits.

For an investigator wishing to engage the services of the Crime Detection Laboratory, it is necessary to complete a request for analysis of the exhibit they wish to have examined and deliver that exhibit, either in person or by double registered mail, directly to the Crime Detection Laboratory to ensure continuity of the exhibit. Once examined, the analyst will return the exhibit again either by calling for a personal pick up or by double registered mail along with a certificate of analysis detailing the result of the examination. The certificate of analysis can become an exhibit for disclosure to the defense in a criminal case, and, if uncontested, will be accepted by the court as evidence. If contested, the Crime Detection Laboratory Scientist will be called to attend court and provide testimony of the examination and the results as an expert witness. They are generally cross examined by the defense to validate their expert qualifications and analyzes.

Summary

This chapter outlined a wide variety of forensic tools and services available for criminal investigators. For any investigator, knowledge of forensic tools and services provides him/her with the ability to recognize and seize on evidence opportunities that

would not otherwise be possible. The picture of physical evidence found at any crime scene only has face value as a collection of objects to be viewed and considered in their existing connection to the event. Analysis of those same objects using forensic tools can add significant information, making a circumstantial connection between the players and the event, and adding new insights. Forensic analysis can be the tipping point in solving a crime, keeping from becoming a cold case.

Study Questions

- In terms of a physical matching, what is the difference between a Level One and a Level-Two examination?
- How are latent fingerprints made visible?
- What is the difference between a Level One and Level Two ballistics examination?
- What is blood spatter analysis?
- What are four common post-mortem indicators considered in an autopsy?
- How else can a pathologist be helpful to police besides being able to speak to cause of death?
- What is forensic archaeology?
- What is forensic entomology?
- What is criminal profiling?
- What is ViCLASS?

Broken Windows Policing ^[95]

Banishment policies grant police the authority to formally ban individuals from entering public housing and arrest them for trespassing if they violate the ban. Despite its widespread use and the social consequences resulting from it, an empirical evaluation of the effectiveness of banishment has not been performed. Understanding banishment enforcement is an evolution of broken windows policing, this study explores how effective bans are at reducing crime in public housing. We analyze crime data, spanning the years 2001–2012, from six public housing communities and 13 surrounding communities in one southeastern U.S. city. Using Arellano-Bond dynamic panel models, we investigate whether or not issuing bans predicts reductions in property and violent crimes as well as increases in drug and trespass arrests in public housing. We find that this brand of broken windows policing does reduce crime, albeit relatively small reductions and only for property crime, while resulting in an increase in trespass arrests. Given our findings that these policies have only a modest impact on property crime yet produce relatively larger increases in arrests for minor offenses in communities of color, and ultimately have no significant impact on violent crime, it will be important for police, communities, and policy makers to discuss whether the returns are worth the potential costs.

Introduction

The broken windows theory of crime suggests that physical disorder in neighborhoods leads to social disorder and eventually serious crime. In efforts to reduce serious crime, proponents of the theory have developed a broken windows policing strategy, which was made famous by New York City's "quality-of-life policing" strategy. Broken windows policing targets low-level misdemeanor crimes to prevent serious crime. While the effectiveness of the strategy has been debated and its use is controversial, within public housing, an evolution of broken windows policing has made its way into the lives of residents through a process of legal banishment. Banishment policies grant police the authority to formally prohibit individuals from entering public housing properties and arrest them for trespassing if they then violate the ban.

Public housing agencies (PHAs) justify banishment by arguing that it is a strategy for reducing serious crime in public housing. In addition to attempting to stymie social disorder through the issuing of formal bans, this policy grants police the opportunity to more easily control drug possession and potential sales since banned individuals can be arrested for trespassing and subsequently searched if they enter public housing. In this way, banishment serves two purposes for police: it allows them to remove potential criminals and makes it easier to enforce drug laws.

Despite the widespread use of banishment policies and the evaluation of policing efforts in public housing, an empirical evaluation of the impact of banishment on reducing crime or making drug arrests has not been performed. This study is the first to explore the effect these bans have on crime and drug arrests in public housing. As will be explained below, this strategy, which has been shown to be disproportionately used in disenfranchised communities, empowers the police and can result in citizens being permanently excluded from spaces even if they have been invited. The result of these policies can have serious social consequences for the banned individuals, their families, and the communities in which it is used. Given the potential social costs, understanding the effectiveness of banishment enforcement in public housing is therefore critical. Thus, the current study adds to the extant literature on broken windows policing broadly, the policing of public housing generally, and banishment in public housing specifically.

More precisely, we extend on the work done by Torres which investigated the perceived effectiveness of banishment and police in Kings Housing Authority (KHA) and found that public housing residents are more likely to find banishment and police effective if they trusted the police. Notwithstanding the significance of perceptions toward banishment's effectiveness, we turn our attention here to address whether issuing bans predicts reductions in property and violent crimes in KHA. ¹ We also explore whether issuing bans predicts increases in drug and trespass arrests. We rely on crime data from 19 communities in one southeastern U.S. city: six public housing communities and 13 surrounding communities. We find that this brand of broken windows policing does work to reduce crime, albeit relatively small reductions and only for property crime. Furthermore, we find that banishment results in an increase in trespass arrests. Both of these findings raise questions about whether or not PHAs and police departments should continue to use banishment. On the one hand, banishment has been shown to modestly reduce property crime. However, it generates a significant increase in trespass arrests, which brings into question its usefulness as a deterrent, increases the number of low-level arrests in neighborhoods that are disproportionately composed of people of color, and does not significantly reduce violent crime.

Background

Banishment in Public Housing

In the wake of the War on Drugs and specifically the Anti-Drug Abuse Act of 1988, PHAs took considerable measures to stem the proliferation of drugs and violence within their communities. One logical strategy was banishment or “no-trespass policies”. Under banishment policies, PHAs can ask their local police department to warn nonresidents that they may be banned if they engage in criminal and civil behaviors, past or present, that PHAs consider worthy of banishment. Banned persons are placed on a no-trespass list maintained by PHAs or police. Once banned, individuals found on the property can be arrested for trespassing. For an idea of how critical PHAs have felt that banishment is vital to crime suppression, a survey of PHAs was conducted in 2003 by the Council of Large Public Housing Authorities, the National Association of Housing and Redevelopment Officials, and the Public Housing Authorities Directors Association. Results from the survey indicate that 85 percent (307 out of 368) of PHAs had adopted no-trespass policies, 97 percent had adopted these policies “in whole or in part as a measure to protect residents from crime or illegal drugs,” and over 98 percent felt that no-trespass policies were “essential to controlling crime and drugs in [their] developments”.

The re-emergence of banishment policies grew as cities took measures to combat social disorder through civility codes. During the 1960s and 1970s, vagrancy statutes were invalidated by the Supreme Court due to their racially biased enforcement and vague interpretation that led to wide discretion in vagrancy enforcement. In the 1980s, with police departments feeling the need for a law enforcement response to social disorder, courts responded in support of the police through the enactment of civility codes. Instead of the vague loitering and vagrancy statutes of the 1960s and 1970s, newly established civility codes required localities to specify the exact behaviors that can result in an arrest [7]. Through civility codes, police can now target the socially undesirable, such as homeless or publicly intoxicated individuals, by enforcing codes that outlaw their behaviors (e.g., public urination, sleeping on a park bench, panhandling).

Banishment in public housing is based on the enforcement of such civility codes by codifying into PHA policy the prohibition of specific civil and criminal acts, past or present, that when observed by PHA officials and law enforcement can result in banishment and potentially an arrest for trespassing. Due to civility codes, the banning of non-residents by PHAs follows strict guidelines that have been specifically detailed. While many initial banishment policies in public housing failed to delineate the behaviors that could qualify for banishment, the courts did not abolish banishment altogether in cases that questioned the legality of banishment stops—they simply required PHAs to specify the criteria for banishment.

Despite these court mandates, the current criteria for banning in PHAs sometimes involve vague, broad, and numerous acts, allowing the possibility for any non-resident to get banned. For example, the following reasons, taken from publicly available PHA banishment policies, have been cited for instituting bans: having no legal right or legitimate purpose to be on the property; not being an invited guest of a resident; having a prior criminal history; engaging in activities that interfere with the quiet and peaceful enjoyment of residents; and involvement in drug activity or violence on public housing property. Not surprisingly, the ability of these policies to ban nearly anyone has received much criticism from scholars. However, since such policies are civil in nature they are beyond judicial review.

Broken Windows

In 1982, James Q. Wilson and George Kelling published an Atlantic Monthly article introducing the broken windows theory of crime. The broken windows theory of crime posits that physical disorder, such as graffiti, may not only change the physical character of an area but may lead to social disorder and ultimately to serious crime. Specifically, the theory argues that serious

crime may be the final outcome, because physical decay conveys to criminals that informal social controls in the area are weak as local residents become more fearful of the ensuing social disorder and withdraw from the community. The theory was instrumental for a 1980s era that was synonymous with “get tough” on crime measures focused mainly on sentencing regimes.

While the major theoretical foundation of broken windows relies on the link between physical disorder and crime, the idea that social disorder can manifest into more serious crime became the ideology behind broken windows policing. Here, law enforcement concentrates on the second aspect of broken windows, social disorder. If social disorder leads to more serious crime, then arrests should be targeted at low-level offenses that visibly convey social disorder, such as loitering, drinking in public, public urination, panhandling, and prostitution. This style of policing would later take center stage in New York City during the 1990s under Mayor Giuliani and Police Commissioner William Bratton. Together they introduced an aggressive form of broken windows policing that targeted low-level misdemeanor offenses, sometimes called “quality-of-life policing”.

Chapter 7 - Community Oriented Policing vs. Problem Oriented Policing ^[96]

Community Oriented Policing (COP) and Problem Oriented Policing (POP) burst onto the police scene, primarily in the New York City Police Department in 1990’s, touted as the “silver bullet” for addressing crime issues in the Big Apple. Community Policing was in place in many police organizations well before this, but under the guise of community service; particularly in smaller police agencies (10-25 sworn members). The increased crime notoriety and attention garnered in major cities added expediency to the issue of addressing crime in a more effective and efficient fashion; ergo the Community Oriented and Community Policing philosophies gained prominence among policy makers.

What is COP and POP? And why does it deserve attention? These are often misunderstood and considered strategies rather than as a philosophy that focuses on the way that departments are organized and managed and how the infrastructure can be changed to support the philosophical shift that may support community policing. They are both defined as a philosophy, but COP is designed to build partnerships within the community that are helpful to resolve issues and problems (Goldstein, 2001 cited by Choi, Turner, & Volden, 2002). Whereas POP is a management strategy that further breaks disorder, disruption, criminal activity and criminal enterprise into more microscopic units for examination. POP utilizes crime data analysis, community input and police officer experience to develop a strategic and systemic approach to resolving the issues impacting quality of life. POP is generally employed for purpose of finality rather than simply relocating the problem. Both philosophies (strategies incorporated) place greater value on prevention through public and private collaborations for the sole purpose of increasing the quality of life while reducing crime and the fear of crime. Most often these are employed through robust strategies with a commitment to implement long-term strategy, rigorously evaluating its effectiveness, and, subsequently, reporting the results in ways that will benefit other police agencies and that will ultimately contribute to building a body of knowledge that supports the further professionalization of the police (Goldstein, 2001 cited by Choi et al., 2002).

Community and Problem Oriented Policy:

Since the unrest of the 60’s in the United States the need for police/community collaboration was never more evident than in York, PA. The need for community-oriented policing (COP) and problem-oriented policing (POP) was not only needed but was in demand. However as in most government initiatives, resources were not readily available. An individual component of COP/POP Philosophy is the data driven information derived from community data files. Discussed as a single strategy in most situations is COMPSTAT. COMPSTAT is a statistical measure of crime used in forecasting crime and supports innovative strategies to combat future crime. Strategies commonly deal with quality-of-life issues, and community orchestrated programs to prevent further debilitation of neighborhoods; however, they should not be confused as standalone strategies with any efficiencies. These strategies are ineffective unless in collaboration with each other or other strategies provided as examples in this historical review of York City.

Did the need for COP/POP exist in York, PA? Mr. Bobby Simpson, Director of Crispus Attucks of York (personal communication, 2011) likened the York City Police Force of the 1950’s, 1960’s and 1970’s to those of Alabama during the Countries racial crisis. The police brutality was insidious, pervasive and had the blessing of the white community, the media at the time, and the business community. Researchers maintain “This governing class maintains and manages our political and economic structures in such a way that these structures continue to yield an amazing proportion of our wealth to minuscule upper class” (p. 94). The G.I. Bill after World War II, as it relates to educational benefits, may be classified as affirmative action programs for white males because they were not extended to African Americans or women of any race (Ore, 2009). Mr. Simpson, Director of Crispus Attucks, contends that although problems remain today, overall things have improved in the City of York (personal communications, 2011).

Much of the black population considered police hostile to minorities. Police were poorly trained particularly in coping with civil disturbances. Police lacked policies dealing with canines, firearms and chemicals and The York City administration rigidly adhered to a policy of preservation of status quo and the exclusion of non-whites from policy making (PA Human Relations Commission, 1968). Mayor John Brenner issued his direction to address these and other policing policies as previously stated. The Mayor directed as part of the overarching approach of securing a greater quality of life in York is that of COP/POP policy and required the York City Police Department to devise and implement programs consistent with the needs of the community.

The police policies required triangulated data using neighborhood input, local crime data, and useable intelligence in cooperation with educational systems, job training, and neighborhood restoration projects to rejuvenate York City. In particular, local data should be the most reliable, current data, and used in an efficient manner that may produce efficiencies otherwise left to chance. COMPSTAT (Computerized Statistics) a nationally recognized program originally introduced in New York City is a strategic problem-solving system that combines “state-of-the art management principles with cutting-edge crime analysis and geographic systems technology” (Willis, Mastrofski, & Weisburd, 2004).

A COMPSTAT program has as its explicit purpose to help police departments fight crime and improve the quality of life in their communities. This is achieved by overcoming traditional bureaucratic irrationalities, such as loss of focus on reducing crime, department fragmentation, and lack of cooperation between units because of “red tape” and turf battles, and lack of timely data on which to base crime control strategies and to evaluate the strategies that are implemented (Weisburd, Mastrofski, McNally, Greenspan, & Willis, 2003).

A Problem Oriented Policing strategy that was found useful in New York City’s transition was that of the information produced by the COMPSTAT that was also used by the Police Commissioner to judge the performance of precinct commanders and by precinct commanders to hold their officers accountable. Unlike traditional police bureaucracies, the COMPSTAT is intended to make police organizations “more focused, knowledge-based, and agile” (Willis et al., 2004). COMPSTAT has proven itself, however it is posited here that COMPSTAT enacted without simultaneous strategies is nothing more than another single tool in the agency toolbox. COMPSTAT is a singular strategy that when used in concert with other COP/POP strategies will provide the intended results of efficiency and effectiveness addressing community problems and concerns. COMPSTAT as an inter-disciplinary research topic has significant impact on other criminal justice systems and one does not have to travel too far from NYPD to find such a study. A similar data collection and accountability was initiated in York City and was led by the Captain of Operations.

A similar COMPSTAT program is engineered by the New York City Department of Corrections that operates under the Total Efficiency Accountability Management Systems (TEAMS) (Horn, 2008). In addition to decreasing jail violence and improving the health and safety of the inmates TEAMS tracks data on more than 600 large and small aspects of the day-to-day life of the city's jails. These aspects range from escapes and homicides to the number of inmates regularly attending religious services and the length of time inmates must wait before they are seen for medical care in the clinic. The Department measures the time it takes to process and house a newly admitted inmate and counts searches, contraband finds, days lost to sick leave, overtime, maintenance order backlogs and hundreds of other metrics. Knowing that information is management power; the Department even measures the cleanliness of its showers and toilets, and here too, data management and accountability have produced positive results (Horn, 2008).

Again, TEAMS is not a stand-alone proposition, but rather a strategy that is used in unison with other data/information, programs and strategies simultaneously. Management to line-officer accountability has demonstrated positive developments within the criminal justice field when used in concert with other adaptations for improvement.

Walsh and Vito (2004) contend that “COMPSTAT is a goal-oriented, strategic management process that uses information technology, operational strategy and managerial accountability to guide police operations...reduce crime and improve the quality of life” (p.57). Further bolstering the point that COMPSTAT cannot be successful without collaboration with other tactics it is asserted in the FBI Law Enforcement Bulletin, four crime reduction principles that create the framework for the COMPSTAT process are: accurate and timely data; effective tactics; rapid deployment of personnel and resources; and relentless follow-up (Shane, 2004).

Additionally, police have access to a closely associated by-product of the computer age, Crime Mapping, which is the implementation of geographic mapping of crime using these systems they link maps of the agency jurisdiction with other computerized police records and replaces the old pin maps (LaVigne and Wartell, 2000). Technology has advanced rapidly and continues to do so daily, however not all police agencies have access to either of these systems nor do they have the required resources required for implementation.

COMPSTAT is an important strategy for Community Oriented Policing and Problem Oriented Policing philosophy implementation. Although critical, COMPSTAT is not without critics who have cited the program as a method of stricter control over managers and line-officers in a police organization. In practice it appears that COMPSTAT, at least so far, is just another way—albeit one that employs advanced technology and different management principles—for police leadership to control mid-level managers (precinct commanders) and street-level police officers (Moore, 2003). COMPSTAT is important to both the COP/POP as it represents accurate, timely data critical to the decision-making process, particularly during resource limited situations as is the City of York’s case.

Critics argue that COMPSTAT has had the opposite effect desired in an atmosphere of Community Policing. Rather than empowering line-officers to act independent of the bureaucracy, it has grieved the line-officer to an art form of submissiveness more fearful to act. COMPSTAT represents a sea change in managing police operations, and perhaps the most radical change in history (McDonald, 2004), but remains a single tool in the toolbox of COP/POP. The question remains- “Have today’s law enforcement leaders-maintained pace with the technology and information highway, altered leadership styles accordingly to more efficiently manage the organization, and empowerment of those providing the service?”

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