

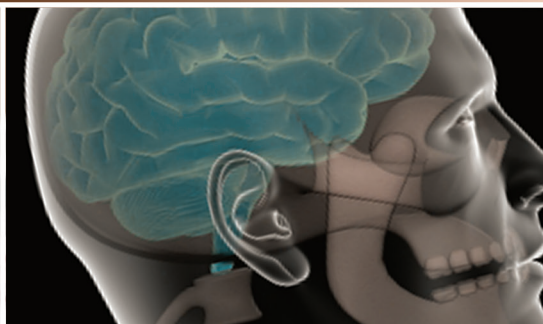


Alberta Distance Learning Centre

Forensic Studies 35

Module 5 Criminal Profiling

Module 6 Anthropology and Forensic Entomology



Forensic Studies 35

LDC 3569

Module 5 Criminal Profiling



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Module 5: Criminal Profiling

Overview

Criminal profiling helps law enforcement officers in their pursuit of unknown suspects. This investigative tool is also known as

- offender profiling
- psychological profiling
- criminal personality profiling
- behavioural profiling
- criminal investigative analysis

In criminal profiling, a criminal suspect is analyzed based on the nature of the offence and the manner in which it was committed. Various aspects of the criminal's personality may be determined from his or her choices before, during, and after the crime. In addition, a comparison with the characteristics of known personality types, mental abnormalities, and criminal profiles further helps to clarify traits the culprit may possess. This information in combination with the physical evidence helps to develop a practical working profile of the offender.

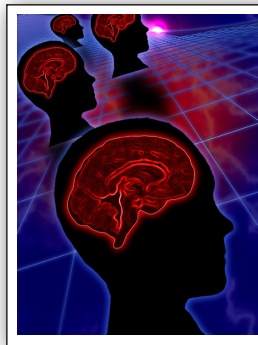
Geographic profiling is a sub-type of criminal profiling. This criminal investigative technique analyzes the locations of a connected series of crimes to determine the most probable area where the suspect may be found. Geographic profiling is used in serious criminal cases of serial homicide, rape, serial arson, bombing, and serial robbery.

- Lesson 1 discusses the historical use of criminal profiling, the steps involved in the creation of a criminal profile, and some of the main behavioural and personality characteristics often found in criminal profiles.
- Lesson 2 explores the use of criminal profiling in homicide investigations. The various types of multiple murderers are described, as are *organized offenders* and *disorganized offenders*.
- Lesson 3 describes geographic profiling, how it is used in criminal investigations, and how this technique was formally developed in Canada.
- Lesson 4 examines two historical crime cases that involved criminal profiling: the *Railway Killer* case and the *BTK Strangler* case.

Module Learner Objectives

By the end of Module 5, you should be able to...

- appreciate the value of criminal profiling in criminal investigations
- outline the types of crimes for which a criminal profile is necessary
- understand the five main steps involved in generating a criminal profile
- compare the traits of an organized offender with those of a disorganized offender
- identify a given criminal suspect(s) as an organized, disorganized, or combination offender
- outline the contents of a criminal profile report and explain the characteristics included in the report
- analyze or create a criminal profile of a criminal suspect using mock crime scene data
- explain the use and purpose of a subset of criminal profiling: geographic profiling
- analyze or create a geographic profile of a criminal suspect using mock crime scene data
- discuss a historical crime case(s) that involved the use of criminal profiling and/or geographic profiling (such as *Washington Sniper shootings*, *Oklahoma federal building bombing*, *Unabomber*, *Anthrax letters*, *Mad Bomber*, or *Son of Sam*).



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Did You Know?



"Crime is terribly revealing. Try and vary your methods as you will, your tastes, your habits, your attitude of mind, and your soul is revealed by your actions."

- Agatha Christie (English detective, novelist, and playwright, 1890-1976)

Lesson 1: Creating a Criminal Profile

Lesson Objectives: *The student will...*



- appreciate the value that criminal profiling serves in criminal investigations
- outline the types of crimes for which the creation of a criminal profile is necessary
- understand the five main steps involved in generating a criminal profile



In the investigation of a serious crime, the first step is the study of clues, the second is the study of the crime itself, and the third is criminal profiling, which is the study of the abnormal *psyche* of the criminal. A criminal profile identifies some of the major personality and behavioural characteristics of an unknown offender based on an analysis of the crime(s) committed. Criminal profiling is an investigative technique that produces a list of potential characteristics of a suspect. This helps investigators to shorten their lists of suspects.

Historically, criminal profiling was simply professional advice about criminal behaviour given to police investigators by individual psychologists or psychiatrists. The interpretations they made about criminal behaviour were the result of their knowledge of the human personality and various psychological disorders.



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Did You Know?



The *Vidocq Society* is an exclusive crime-solving club that meets every month in Philadelphia, Pennsylvania, U.S.A. Members are forensic professionals, especially current and former FBI criminal profilers, homicide investigators, various forensic scientists, psychologists, and coroners. At meetings, Vidocq Society members listen to law enforcement officials from around the world present cold cases for review and then offer them expert advice free of charge. *The Vidocq Society will not become involved in just any criminal case; it must meet their strict criteria. The society was named after Eugène François Vidocq, a legendary nineteenth century French detective and former criminal who used his knowledge of the criminal mind to look at cold case homicides from the psychological perspective of the perpetrator.*



Image courtesy of Sergeant A. Kowalyk, Edmonton Police Service

History of Criminal Profiling



Take Notes

The first early use of criminal profiling occurred in the 1880s when Dr. Thomas Bond was involved in the investigation of a series of grisly murders by a killer known as *Jack the Ripper*. Dr. Bond performed an **autopsy** of one of the victims and reconstructed the crime scene to interpret the behaviours and possible personality of the killer. In his profile of *Jack the Ripper*, Bond proposed that all of the murders had been committed by one person who was physically strong, composed, and daring. Dr. Bond suggested that the unknown offender was quiet and harmless in appearance, middle-aged, and neatly attired, probably wearing a cloak to hide the blood from his attacks. He was likely a loner, eccentric, and mentally unstable. Contrary to popular opinion, Bond also believed that the offender had no anatomical knowledge and was not a surgeon or butcher. Despite Dr. Bond's profile, the *Jack the Ripper* case remains a mystery to this day. Many consider Dr. Bond to be a true pioneer in the field of criminal profiling and that his work helped opened the way for future criminal profilers.

The next known use of criminal profiling in history came during World War II when Dr. Walter Langer was asked to create a profile of Germany's leader, Adolf Hitler. The Allies asked Dr. Langer to explain Hitler's mindset, suggest his motives, and predict his actions if he was apprehended. Dr. Langer's detailed 135-page profile outlined Hitler's behavioural traits and correctly predicted that Hitler would commit suicide if Germany lost the war. Odd traits that Dr. Langer discovered and discussed in his profile of Hitler included why Hitler often walked diagonally across a room while whistling a marching tune. He also stated that Hitler feared syphilis, germs, and moonlight and that he loved the sight of severed heads and risky circus acts.

The individual who perhaps single-handedly managed to demonstrate the value of criminal profiling to modern law enforcement was Dr. James Brussel. In 1956, Dr. Brussel's profile of the *Mad Bomber* of New York City led to the arrest of the culprit. Dr. Brussels' report was so accurate that it even detailed correctly the clothing the bomber would be wearing when arrested (a double-breasted business suit).



Take Notes

Dr. Brussel was later invited to work on the *Boston Strangler* case in 1964. He convinced investigators that only one strangler existed, not two as was previously thought. Again, Brussel's profile was accurate, leading to the arrest of Albert De Salvo.

In the early 1970s, the *Federal Bureau of Investigation* (FBI) created a Behavioural Science Unit, the first of its kind in the world. Two FBI agents within this new unit, Patrick J. Mullany and Howard D. Teten, designed a method by which crime scene evidence and the details of crimes and criminal behaviour could be used to predict the behavioural trends, personality traits and perhaps even the mental disorders of the suspect. The systematic profiling technique became known as the *Criminal Investigative Analysis Program*.

Also during the early 1970s, Dr. Robert D. Keppel and Dr. Richard Walter published a groundbreaking article that grouped sexual murderers into four distinct sub-types: power-assertion, power-reassurance, anger-retaliatory, and anger-excitation. They also created HITS, a database that lists characteristics of violent crimes so that common threads could be investigated. Keppel was a police detective who earned his Ph.D. in criminology, and Walter was a prison psychologist who had interviewed more than 2000 murderers, sex-offenders, and serial killers. Both Keppel and Walter began seeing common threads among offenders, which led to the publication of their article.

During the late 1970's, FBI agents John Douglas and Robert Ressler created a method of classifying criminals who had committed serious crimes. They created an *organized* or *disorganized* methodology after studying and interviewing convicted sex murderers. Their method provided more information about the behavioural patterns and personality characteristics of criminals. It is used extensively by law enforcement agencies today.

Since the 1980s, criminal profiling has become a widely used and officially sanctioned investigative technique in the investigation of serious crimes. Some major police departments either have a criminal profiling unit or regularly consult criminal profiling experts.

Did You Know?



In June of 1973, the FBI caught the first murder suspect with the help of criminal profiling. A seven-year-old girl was abducted from a campsite in Montana. The girl was taken from her tent in the middle of the night before she could alert her parents who were sleeping nearby. Howard Teten, Patrick Mullany, and Robert Ressler created a profile that suggested the abductor was a young white male who was homicidal and would mutilate his victims after killing them. They also predicted that he would take body parts from his victims as souvenirs. The profile led to the arrest of David Meirhofer, a 23-year-old single male who was a suspect in another murder case. The search of Meirhofer's house unearthed souvenir body parts from his victims.

FBI Headquarters, Washington, D.C.



Image courtesy of Sergeant A. Kowalyk, Edmonton Police Service

The FBI Criminal Profiling Method



Take Notes

Criminal profiling was first used officially in criminal investigations by the *Federal Bureau of Investigation* (FBI) in the United States. The most common method was developed by the FBI and involves comparing the behaviour of the unknown offender to the behaviour of those offenders the profiler has encountered and to the broad offender groups developed through the study of similar crimes and criminals.

Today's profilers are officially known as criminal investigative analysts. The use of this investigative tool remains relatively limited since its inception over thirty years ago. Only a small number of qualified personnel are highly trained in the science and methodology of criminal profiling. This limits its use to only the most serious criminal investigations, typically those involving serial cases of murder, multiple murders, or sexual assault although it has been used in cases of arson, bombing, espionage, stalking, extortion, kidnapping, terrorism, and product tampering.

Did You Know?



Most criminal investigative analysts in North America are veteran FBI special agents who have strong investigative skills. Currently, about 30 criminal investigative analysts work for the FBI profilers and each year receive more than 1000 profiling requests from law enforcement agencies.

A Crime Scene



Image by Flickr user Polandeze

Steps Involved in Criminal Profiling



Take Notes

In general, five steps are taken in the creation of a criminal profile.

1. All available information from the crime scene (such as location, state of the scene, time of day, and time of year) and any physical evidence is analyzed.
2. All witness statements and, if possible, the victim's account of the crime are reviewed. In a murder investigation, the autopsy results are reviewed.
3. The sequence of events leading to and occurring during the crime is suggested in the profile. A detailed list of personality and behavioural characteristics of the offender are included in the profile.
4. Investigators use the criminal profile to shorten their list of suspects. If no suspect fits the profile, it is reassessed. A criminal profile report does not generate a list of suspects. Rather, it helps law enforcement officials focus their investigation upon suspects who fit the profile. If new evidence arises during the investigation, the initial profile is reviewed and may possibly be changed. If none of the suspects fits the criteria, the profile may be re-evaluated. In both these cases, the profile may be returned to the initial profiler or possibly be passed to a second profiler for re-examination.
5. If a suspect has been apprehended, the criminal profile created is evaluated to determine its accuracy. The profile generated is compared with the actual suspect who has been apprehended. This process helps the profiler to determine the accuracy of the report.



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Personality and Behavioural Characteristics of a Criminal



In a criminal profile, information from a crime scene(s), physical evidence, and statements of witnesses and/or victims helps to shed light upon certain personality and behavioural characteristics of the offender in question. To determine these personality and behavioural characteristics, criminal profilers use data from scientific research involving criminal behaviour and the personalities of criminals. **Qualitative** analysis of trends and patterns from crimes of the past are also used.

For example, research completed by **social scientists** has revealed that convicted **serial murderers** share several traits. Serial murderers are defined as people who kill three or more victims, each on separate occasions. Unlike **mass murderers**, serial killers usually select a certain type of victim who fulfills a role in their fantasies. Social scientists have found that serial killers are most often white males aged 25 to 34, of at least average intelligence, and often with charming personalities. Most serial murderers are **illegitimate** children and experienced sexual or physical abuse during their childhoods. Serial killers tend to select **vulnerable** victims whom they can control. They prefer to kill using hands-on methods such as strangling and stabbing. Researchers found that serial killers are impressed with police work and like to associate with police or pretend to be police officers.

Criminal profilers will state only the behavioural and personality characteristics that can be justified from the information they have gathered from the case in question. In other words, criminal profilers outline only the behavioural and personality characteristics they can explain using research data and valid trends and patterns about convicted criminals

Did You Know?



The criminal profile used with the Washington Sniper shootings in 2002 was inaccurate. A profile proposed that the killer was a middle-aged white male. In fact, the shootings were done by two black males, one of whom was only 17 years old.



Some of the behavioural and personality characteristics often found in a criminal profile include the following:

- **Age:** usually given as a range of possible ages for the suspect (For example, most serial killers are between the ages of 20 and 35 years while 75% of all sexual assaults are committed by culprits that are less than 25 year.)
- **Gender:** often determined by the gender of the victims and the nature of the crime scene (For example, 75% of all sex assaults are committed by white males.)
- **Ancestry:** usually the same as the first victim
- **Residency:** determined by using geographical profiling
- **Intelligence Level:** higher level of intelligence, especially in carefully planned crimes
- **Occupation:** consistently employed in certain types of positions (For example, most serial arsonists are employed in *subservient* positions.) or recently become unemployed (For example, many mass murderers have experienced recent job loss.)
- **Marital Status:** varies among single, married, separated, divorced, or widowed (For example, most sex offenders and pedophiles are single.)
- **Motivating Factors:** whether the crime was random or planned in detail (For example, little physical evidence at a crime scene that appears unaltered often indicates the crime was *premeditated*. The nature of a victim's injuries may indicate whether the suspect had personal anger towards the victim.)
- **Arrest Record:** often committed by a suspect with an arrest record or by someone who has committed crimes but has not been caught
- **Provocation Factors:** ways to cause perpetrators to come forward (For example, criminal profilers often suggest methods to draw out the suspect.)

Did You Know?



Serial murderers are difficult to apprehend because they plan their murders, often travel long distances between their crimes, and frequently wait months between killings.

CRIMINAL PROFILING CASE STUDY: The Mad Bomber

Grand Central Station, New York City



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Take Notes

One of the earliest cases involving this method of forensic investigative analysis involved George Metesky, otherwise known as the *Mad Bomber*, who terrorized New York City through a carefully orchestrated bombing campaign that lasted from 1940 until 1956.

Metesky had worked for *United Electric & Power Company* in the early 1930s, but he was fired when he sued for compensation after being injured in a work-related accident. Metesky believed that he had developed tuberculosis because of his accident, but his court case was eventually dismissed. His **indignation** and outrage led to many angry letters to *Consolidated Edison*, a large **conglomerate** that had been created by the merger of several small utility companies including *United Electric & Power Company* in the early 1930s. Metesky's anger and mental instability led him to place his first bomb at the *Consolidated Edison* building in downtown New York City in November 1940. Designed as a small pipe bomb, the device never detonated. Police found a crumpled note wrapped around it, bearing the words "*CON EDISON CROOKS, THIS IS FOR YOU.*" The subsequent police investigation failed to disclose any further evidence, and the matter was considered closed until nearly a year later when a similar device was found nearby.

Did You Know?



"In a situation where you find a distant mother, an absent or abusive father and siblings, a non-intervening school system, an ineffective social services system, and an inability of the person to relate sexually in a normal way to others, you have almost a formula for producing a deviant [not necessarily murderous] personality."

- Robert K. Ressler, *Whoever Fights Monsters*, (p. 93)



Investigators from the New York Police Department (NYPD) recognized the construction as similar to the previous device. They were suspicious that this bomb had simply been abandoned in the street. Surprisingly, police received an anonymous letter from Metesky in December 1941 indicating that his patriotic feelings stemming from U.S. entry into World War II meant he would refrain from setting any more bombs until after the war. Metesky's identity remained hidden from police during this time, and he continued to send threatening letters to Con Edison, the electricity giant in the New York area.

Then, in March 1950, police discovered an unexploded bomb in Grand Central Station. They believed it to have been constructed by the individual who had planted bombs of similar construction almost 10 years earlier. Police and public grew increasingly concerned when two bombs detonated inside the New York Public Library and Grand Central Station. By 1956, the person known as the *Mad Bomber* had targeted public places such as movie theatres with more than 30 bombs. In December 1956, one bomb hidden within the seat cushion of a movie theatre seat injured six people. A wave of panic set in among the people of New York.

Metesky had improved his bomb-making skills over the years. As a result, the devices he left all over New York were impossible to trace. As the bombs grew in destructive power, so too did the public demand that the NYPD capture the *Mad Bomber*.

Traditional investigation had been completely unsuccessful, so members of the NYPD crime lab decided to use a radical approach. The suggestion of a psychological profile was not an entirely new idea, but it stimulated much discussion. Acting on a recommendation from internal police sources, a Manhattan criminal psychiatrist named Dr. James Brussel was approached for assistance.

Dr. Brussel, having once served as the Assistant Commissioner of Mental Hygiene for the State of New York, was aware of the ongoing investigation and was interested in the suspect's personal motivation. His previous counterintelligence work for the FBI and professional background in neuropsychiatry during World War II prepared him for what he was about to take on.

Dr. Brussel reviewed the case file and developed a psychological profile of the suspect, deducing that he suffered from mental illness, most likely paranoia. Dr. Brussel's profile of the suspect identified him as a past employee of *Consolidated Edison*, approximately 50 years of age, meticulous in terms of behaviour, with language patterns indicative of foreign ancestry. Letters written by the suspect were subjected to handwriting analysis, and his writing ability and language skills supported the belief that he had likely not attended college. Dr. Brussel reached other conclusions as well, some of which were seen as *dubious*. Some of these included the assumption that the suspect was single and living with a female relative who was not his mother, based on the *phallic* nature of his bombs and subsequent handwriting analysis that suggested the suspect drew the letter "W" in a sexually suggestive manner.



Dr. Brussel suggested that, contrary to conventional wisdom, details of the profile should be widely publicized in an attempt to draw out the suspect. As all major New York papers began to publish a summary of the profile, various people began coming forward to confess to the bombings, but holdback evidence such as crime scene photos and writing samples enabled police to eliminate them quickly. Additional leads flooded in, identifying a number of people suspected of fitting the profile. During this time, Metesky continued writing letters, and even called Dr. Brussel directly, warning him to remove himself from the investigation.

Meanwhile, staff at *Consolidated Edison* continued to review personnel files in hope of finding a past employee who fit the profile. A clerk soon stumbled upon a personnel file for a person named George Metesky of Waterbury, Connecticut, an area north of New York which Dr. Brussel thought may be the home of the suspect. The document revealed that this individual had suffered a work-related accident in the early 1930s and blamed it for his subsequent bout with tuberculosis—a claim that was dismissed in court. After his disability claim was denied, Metesky had written several threatening letters to the company, some of which used language suspiciously similar to that used by “The Mad Bomber”.

The still unidentified bombing suspect responded to a newspaper article and disclosed details of the work-related injury that led to his sense of outrage with *Consolidated Edison*. This information tied him to the personnel files and identified Metesky as a prime suspect. In January 1957, Metesky was arrested, confessing his involvement almost immediately. The profile was a nearly perfect fit. Interestingly, Dr. Brussel had stated that the suspect would be wearing a double-breasted suit when he was arrested. When police requested that Metesky change into new clothes before being transported to police headquarters, he donned a double-breasted suit, buttoned up just as Dr. Brussel had predicted!

Dr. Brussel’s pioneering work on the *Mad Bomber* investigation resulted in fame and further involvement in other criminal investigations. It served as a basis for further development of psychological profiling as a key component in the investigation of serial criminals.

George Metesky was judged not to be criminally responsible due to his state of acute paranoia, and he was committed to a mental hospital. He was released in 1973 and lived his final years at his family’s residence in Connecticut, dying at the age of 90 in 1994.



When you are ready, please complete the assignment for Lesson 1 in the Assignment Booklet.

Did You Know?



In 2004, the homicide rate in Canada was 2.0 per 100 000 people or approximately 650 homicides per year. This rate has remained fairly stable for the past decade, and it is similar to homicide rates in most of the countries in the western world, with the exception of the U.S. that has almost triple the number.

Lesson 2: The Use of Criminal Profiling in Homicide Investigations

Lesson Objectives: *The student will...*



- compare the traits of an organized offender with those of an disorganized offender
- identify a given criminal suspect(s) as being an organized, disorganized, or combination offender
- describe the contents of a criminal profile report and explain the characteristics included in the report
- analyze or create a criminal profile of a criminal suspect from a mock crime scene



Murder is the most serious and heinous of all crimes; mass murders are of particular concern to the public and police. Law enforcement agencies use numerous investigative techniques to apprehend murderers. Criminal profiling has become a useful and invaluable technique employed by police.



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Types of Murderers

History has proven that multiple murderers are of various types, each with distinct characteristics.

A **mass murderer** kills several people, typically at the same time and at one location. Mass murderers are sometimes divided into those who kill only members of their family and those who kill victims to whom they are not related. For example, a former computer programmer, Richard Farley, was fired for stalking one of his co-workers. He returned to his former workplace with a gun, killed seven, and injured four of his ex-colleagues. The female he had stalked was one of the four people injured.

A **spree murderer** kills several victims during a short time, usually in two or more locations. For example, spree killer Seung-Hui Cho, a student at Virginia Polytechnic Institute and State University better known as Virginia Tech, caused the Virginia Tech massacre. The tragedy consisted of two separate shootings about two hours apart in April 2007 on the Virginia Tech campus. Cho killed 32 people and wounded 25 people before committing suicide. The Virginia Tech massacre is the deadliest shooting in modern U.S. history.



Take Notes

A **serial murderer** kills several victims in three or more separate events during a time that may be days, weeks, months, or even years. Many serial killers are psychopaths who are considered to have a personality disorder but appear quite normal and charming. Serial killers are motivated specifically by various psychological urges, primarily power and sexual compulsion. Serial murderers are further categorized into three sub-types:

- **Visionary:** The offender hears voices or sees visions that tell him or her to kill.
- **Missionary:** The offender goes on a hunting mission to rid Earth of a certain group of people.
- **Hedonistic:** Offenders are of four types, all of whom take pleasure in the kill: comfort-oriented, lust-oriented, thrill-oriented, and power-oriented. The latter takes pleasure in domination and manipulation, getting a 'rush' from the victim's misery.

An example of a serial killer is Herbert Williams Mullin who committed 13 murders in various places in California from 1972 to 1973. Mullin was a visionary serial killer claiming voices in his head told him that murder was necessary to prevent California from suffering a massive earthquake. Eerily, no earthquakes occurred in California during his murder spree.

Behaviour Reflects Personality

In criminal profiling and especially in homicide investigations, the behaviour of an offender is thought to reflect the personality of the offender. Profilers try to predict the personality of the offender after analyzing the suspect's behaviour before, during, and after the crime. To predict personality from behaviour, criminal profilers often try to answer the following questions:

- **Before the Murder:**
 - The offender hears voices or sees visions that tell him or her to kill.
 - What triggered the murderer to act on some days and not others?
- **Method:**
 - What type of victim or victims did the murderer select?
 - What was the method of murder (shooting, stabbing, strangulation, or something else)?
- **Body Disposal:**
 - Did the murder and body disposal occur at one scene or at multiple scenes?
- **After the Murder:**
 - Did the murderer try to involve himself in the investigation by reacting to media reports or by contacting investigators?

Organized Offenders or Disorganized Offenders



Take Notes

In 1980, Roy Hazelwood and John Douglas made a distinction between *organized* and *disorganized* criminal behaviour. Both Hazelwood and Douglas were criminal profilers working in the FBI's Behavioral Science unit.



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Organized Offenders: As the name implies, organized offenders plan and execute their crimes in organized ways because they are scheming, deliberate, and *methodical* individuals. The organized offender is a self-absorbed *psychopath* lacking *empathy* and *remorse*. Most organized offenders are *well spoken*, outgoing, and pleasant. Because of this, they appear non-threatening at first. Organized offenders target their victims, choosing primarily strangers whom they often capture by conning them, perhaps by offering money or asking for assistance. Offenders usually bring their own weapons and take them from the crime scenes. Organized offenders are careful; they often take time to clean up or remove evidence such as fingerprints, blood, bullet cartridges, or knives from the crime scenes. Often this type of offender will move or conceal the body.

Disorganized Offenders: In contrast, disorganized offenders are loners with poor social skills. They often feel inadequate and have difficulties maintaining friendships and loving relationships. Disorganized offenders tend to appear unkempt and often will live in messy homes. Their crimes are usually committed *impulsively* sparked by a mental disorder, drugs, alcohol, youth, or inexperience. The disorganized offender tends to attack people they know, such as family, friends, neighbours, or acquaintances. Their victims are *incapacitated* quickly without much warning and usually left badly *mutilated*. They often kill their victims with items at the crime scene and make no effort to hide the weapons or the bodies afterwards. This type of offender leaves a chaotic mess.

Did You Know?



Although rare, mass killings have occurred unintentionally without premeditation. For example, in 1990, Julio González set fire to a New York City nightclub after having a fight there with his girlfriend. His intention was to hurt his girlfriend. She was injured, but 87 people died in the blaze.



The following two lists outline some of the potential behavioural and personality traits often exhibited by organized and disorganized offenders.

ORGANIZED OFFENDER	DISORGANIZED OFFENDER
Older mature individual	Young immature individual
Average to above average intelligence	Below average intelligence
College educated	High school dropout
Socially competent	Socially inadequate
Good hygiene	Poor hygiene
Sexually competent	Sexually incompetent
Father stable	Father unstable
Living with partner	Often lives alone
Crime scene some distance from home	Lives or works near crime scene
Mobility with car in good condition	Often walks or takes public transportation
Follows news media	Minimal interest in news
Contacts police to play games with them	Contacts families of victims
May change jobs or leave town	Doesn't always have a steady job
Responds well to direct interview	Does not respond well in interviews
Functions mainly during the day	Functions mainly at night
Controlled mood during crime	Anxious mood during crime
May use alcohol during crime	Often uses alcohol or drugs
Dismembers body	Leaves body intact
Leaves little physical evidence at scene	Leaves physical evidence at scene
Kills at one site, disposes body elsewhere	Kills and leaves body at one site
Leaves a organized crime scene	Leaves a chaotic crime scene
Resistant to counselling	Responds to counselling

Did You Know?



In about one in three murders in Canada, a person kills someone in his or her family. One in eight murders is gang related.



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Combination Offenders



Some crime scenes demonstrate elements of both criminal sophistication and chaos. These point to an offender with a combination of organized and disorganized characteristics. Although criminals have one or even two characteristics that fit the opposite offender profile, they are considered a combination offender only if they have an equal number of characteristics from both offender categories.

Criminals with combination or mixed characteristics may be described as

- an offender with a short temper, but enough self control to avoid taking unnecessary risks
- an offender unable to control the victim, resulting in a change of behaviour
- a young offender making the transition from disorganized to organized
- assisted by other offenders, each fitting a different behavioural category

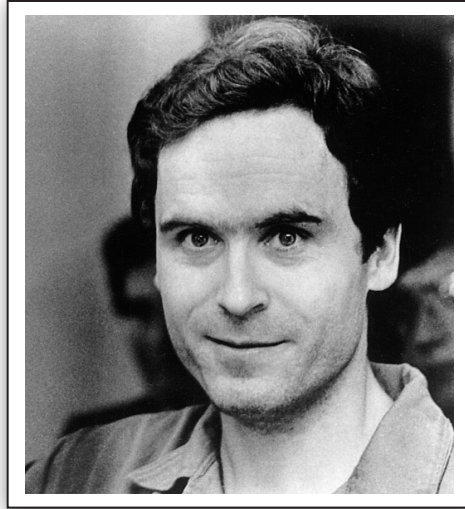
Did You Know?



Some believe that the *perfect crime* is one committed so well that no evidence is apparent and, therefore, the culprit cannot be traced. The most likely individuals to commit *perfect crimes* include suspects who picked victims they do not know and suspects with no criminal records. Nothing is stolen during the crime, and the culprits have told no one about the crimes. Some examples are the *Black Dahlia murder*, the *Zodiac murders*, and the *Chicago Tylenol poisonings*. The possibility remains that a culprit for these so-called *perfect crimes* may someday be identified.

ORGANIZED OFFENDER CASE STUDY: Ted Bundy

Ted Bundy



Everett Collection



His Early Years

Ted Bundy was born in November 1946 at a facility for young unwed mothers. The identity of Bundy's biological father was unknown to him; he grew up thinking his grandparents were actually his parents. To hide the shame of his unwed mother, he was made to believe that his mother was actually his older sister. Bundy achieved high grades in school and was known as well mannered and well dressed. When Bundy went to university for degrees in psychology and eventually law, he fell in love for the first time. However, this relationship ended badly, and he was devastated. Soon after this break up, he discovered his parents were actually his grandparents.

The Washington State Murders

Bundy's first confirmed assault was on the night of January 4, 1974. He entered the basement bedroom of an 18-year-old female dancer and student at the University of Washington. He sexually assaulted the girl, then he beat her with a metal rod from her bed frame. The girl survived and but suffered permanent brain damage. Later that month, Bundy killed another University of Washington student and dumped her body in a separate location. His next attack was in March 1974 at Evergreen State College where he kidnapped and murdered a 19-year-old female student. A month later, a female student from Central Washington State College disappeared. He lured her by wearing a cast on his arm and asking her to help him carry some books to his car, a Volkswagen Beetle.



His next victim was a female student at Oregon State University who was last seen in May 1974. In June 1974, he killed two young female university students, one after she was seen leaving a tavern late one night and the other while she was walking at night from her boyfriend's dorm to her sorority house on the University of Washington campus. Witnesses later reported that a man with a leg cast was seen asking a woman to help him carry a large briefcase to his car, a Volkswagen Beetle.

In July 1974, Bundy changed the location and time of day he hunted for his victims from university campuses at night to parks during the day. Twice during the same day, he abducted and murdered two young females from Lake Sammamish State Park in Washington. Numerous witnesses told the police a handsome young man named Ted with a Canadian accent asked them to help him unload a sailboat from his Volkswagen Beetle because one of his arms was in a sling. Several witnesses actually saw one of the victims walk away from the beach with Ted. All eyewitness accounts led to police distributing a sketch and description of Ted Bundy to newspapers and television stations. This eventually led to Bundy's girlfriend, one of his psychology professors and a former co-worker and now famous crime novelist Ann Rule, to report him as a possible suspect. However, police did not pay much attention to this report because he was a clean-cut law student.

The Utah Murders

In the fall of 1974, Ted Bundy moved from Washington to attend law school in Salt Lake City, Utah, where he continued to kill young females. However, he changed his *modus operandi* (MO). He decided to target young females that were not university students. He lured his victims by claiming to be a police officer conducting an investigation. He abducted and killed three young females during October 1974. However, when he tried this technique in November 1974, it failed twice. On the first occasion, a young female got into Bundy's car after he told her she needed to come with him to the police station. After she was in the car, he handcuffed her. However, when he tried to hit her with a crowbar, she managed to jump from the car while he was driving. This failure did not seem to deter Bundy because later that day he hunted for another victim. At a Utah high school, he tried to convince a teacher and a student to come to his 'police car', but they both refused. Instead, he abducted and killed a 17-year-old female student who was leaving the school to pick up her younger brother.

The Colorado and Idaho Murders

Likely because he had been seen by numerous eye witnesses in Utah, in 1975 Bundy decided to target females in the nearby states of Colorado and Idaho. From January 1975 to May 1975, he abducted and killed four separate females by pretending to have a leg injury and asking for help to his car. One victim was taken just outside her hotel while on a holiday; two victims were abducted in the parking lot of a ski hill; the fourth was a junior high school student who disappeared while walking home from school.



Arrest and Two Escapes

While driving his car in August 1975 in Utah, Bundy was arrested for failing to stop for a police officer. When police searched his Volkswagen Beetle, they found what appeared to be burglary tools: a ski mask, a crowbar, handcuffs, trash bags, and an ice pick. Detectives soon linked his car to the kidnapping in which the girl escaped and to the other Utah murders. In March 1976 following a week-long trial, Bundy was convicted of kidnapping and sentenced to 15 years in prison. In 1977 while awaiting for his trial for the murder of one of the Utah victims, Bundy escaped by jumping out of a second-story window of the court building. He was caught after only six days, but seven months later, he escaped again from jail.

Florida Rampage Leads to Final Arrest

After his second escape, Bundy took a train, then a stolen car, and finally a bus to Florida where he began another murderous rampage. In January 1978, in a 30-minute period late one night, he brutally attacked four female students at a sorority house on the Florida State University campus. Two of the victims died after the attack; the other two were severely injured. Bundy then broke into another home a few blocks away and severely injured another female student while she slept. In February 1978, he killed a 12-year-old girl in south Florida. He was caught less than a week later in a stolen Volkswagen Beetle. He eventually confessed to murdering 35 young women, but many believe the number to be much higher. Ted Bundy was executed on January 24, 1989, after he lost several court appeals.

Bundy's *Modus Operandi*

To gain a better understanding of serial murderers and organized offenders, Ted Bundy was interviewed by criminal profilers while he was incarcerated. Ted Bundy's modus operandi was both fascinating and frightening. It provided experts with a better understanding of the deviant mindset of organized serial murderers.

Did You Know?



Criminal profiler Robert D. Keppel was made famous by striking a working relationship with one of history's most grisly serial murderers, Ted Bundy. While Bundy was serving time for committing more than 30 murders, Keppel asked him to help him create a profile of the then at-large *Green River Killer*. In addition, to getting Bundy's help with this profile, Keppel was also able to get Bundy to confess to several more unsolved murders.



Ted Bundy's MO included the following:

- All Bundy's victims were white females with straight hair between the ages of 15 and 25.
- Most were from middle class families; the majority were college students.
- Bundy often drank alcohol prior to finding a victim.
- After luring a victim to his car, Bundy would hit her on the head with a crowbar. (Every recovered skull except one showed signs of blunt force trauma.)
- Every recovered body, except for one, had been strangled.
- At least half of his victims were decapitated with a hacksaw. (He kept some of the severed heads in his home for some time before disposing of them.)
- Some of the victim's skulls were found with front teeth broken out.
- Many of the victims were dumped a great distance from where they disappeared.
- Bundy confessed to visiting some of his victims' bodies numerous times in the secluded locations where he had dumped them. (He said he would lie with them for hours, applying makeup to their corpses, and performing *necrophilia*.)



Convicted kidnapper Theodore Bundy is led into Pitkin County courthouse, 1977 (AP/ Mark Levy)

Did You Know?



Some criminals (on the advice of their defence lawyers) plead *not guilty by reason of insanity* to excuse themselves from lengthy criminal trials. This type of defence applies to a wide range of mental disorders, one of the most popular being psychosis caused by schizophrenia. Those who argue this type of defence successfully are usually sentenced to clinical treatment rather than prison. They may be released when they are certified *as safe to society*.

DISORGANIZED OFFENDER CASE STUDY: Richard Trenton Chase

Richard Trenton Chase on the night of his arrest

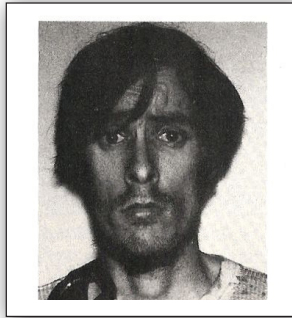


Image courtesy of Flickr user Samhighsun



Early Years

Richard Trenton Chase was born in May 1950 into a middle class family in California, U.S.A. He had a very strict father with whom he was never close and an abusive mother. At age 10, Chase had trouble with bedwetting, he liked playing with fire, and he began torturing and killing cats. In his early teens, he began using drugs and alcohol heavily. He dated some girls in high school, but he stopped to avoid embarrassment when he discovered he had an *erectile dysfunction*.

A Fragile Mental State

After high school and into his twenties, Chase had trouble finding and maintaining employment as well as a place to live because of his strange behaviour and because he looked so unkempt. He was treated various times in psychiatric hospitals and was prescribed anti-psychosis medication that he did not always take. The strange behaviours that lead to this treatment included going into hospital emergency rooms and stating that his pulmonary artery had been stolen or killing dogs and rabbits, then drinking their blood and eating some of their raw organs. He said he did this to maintain his own blood levels, which he felt would disappear if he did not continually stock up. In addition, Chase often held oranges on his head, believing the Vitamin C would absorb into his brain through osmosis.

Committed to a Mental Institution

In 1975, Chase was sent to a mental institution when he contracted blood poisoning after injecting rabbit's blood into his veins. He escaped from the facility and went home to his mother. He was soon apprehended and sent to an institution for the criminally insane. In this facility, he killed some birds while outside and attempted to drink their blood.

After undergoing months of what his physicians thought were successful treatments with various *anti-psychotic* drugs, in 1976 Chase was released into the care of his mother. Mrs. Chase felt Richard did not need to be on the anti-psychotic medication he was prescribed; over time she stopped giving it to him.



First Two Victims

In December 1977, Richard Chase shot his first victim, Ambrose Griffin, in a drive-by shooting outside her home. Just a few blocks away from her, he killed his second victim, Teresa Wallin, in January 1978. Blood was smeared all around Wallin's house after Chase shot her, sexually assaulted her, and removed some of her internal organs.

His Last Victims

One mile away from the Wallin house on January 27, 1978, Chase entered the home of 38-year-old Evelyn Miroth. Once inside, he met Miroth's neighbour, Don Meredith, whom he shot. Then, he stole Meredith's wallet and car keys. Soon afterwards, he shot Evelyn Miroth, her 6-year-old son Jason, and Miroth's 22-month-old nephew, David. He sexually assaulted Miroth and consumed some of her blood. During this carnage, Chase was startled by a knock at the door by a six-year-old girl, a friend of the young Jason Miroth. The frightened girl alerted a neighbour who called police, but Chase fled the scene by stealing Don Meredith's car taking the 22-month-old's body with him. Chase returned to his home with the body where he drank some of the dead toddler's blood, ate some of his internal organs, and dumped the body at a nearby church.

His Arrest and Trial

Upon entering the crime scene, police discovered that Chase had left complete fingerprints, handprints, and shoe imprints in the blood that he had smeared around the home. These prints, in addition to a FBI criminal profile, led to the apprehension of Richard Trenton Chase in February 1978. In January 1979, the four-month trial of Chase began. He was found guilty of six counts of first-degree murder. He was sentenced to death, but he died of a drug overdose in prison before his execution.

His Delusional Motive

When Richard Trenton Chase was asked why he would drink the blood and eat the organs from some of his victims, he said that he needed to do this to prevent Nazis from turning his blood into powder. He believed that Nazis had planted poison beneath his soap dish.

Did You Know?



"The organized offender is a crafty wolf, while the disorganized offender is more like a wild dog."

- Stephen G Michaud and Roy Hazelwood, *The Evil That Men Do*, (1998)

COMBINATION OFFENDER CASE STUDY: Jeffrey Dahmer

Jeffrey Dahmer at his trial



Je

AP/Charles Bennett



Early Years and His First Murder

Jeffrey Dahmer was born on May 21, 1960, and apparently had a happy and healthy childhood. However, at the age of four he underwent surgery for a double hernia after which the family moved to Ohio. These two events seem to change Dahmer; he became very shy, uncommunicative, and very tense around others. During his school years, he was a loner who achieved average grades. He began to drink heavily during high school.

Dahmer's parents divorced after years of fighting. In 1978, his mother left the family immediately after he finished high school; his father soon remarried. Shortly after, at age 18 Dahmer committed his first murder. He picked up a young male hitchhiker, Steven, and brought him to his house where they began drinking together. When Steven wanted to leave Dahmer's house, Dahmer prevented him by killing him and burying him in the backyard.

Early Arrests

Dahmer went to university but failed and had to drop out after one semester. He enrolled in the army, but he was discharged after two years because of his excessive drinking problem. In 1982, at 22 years of age, he moved in with his grandmother in Wisconsin. Later that year, he was arrested for the first time after he exposed his genitals at a state fair. Then in 1986, he was arrested and sentenced to one year in prison for **masturbating** in front of two young boys.

A Series of Murders

In 1988, about one year after his release from prison, Dahmer was arrested and found guilty of drugging and **molesting** a 13-year-old boy. In 1989, while he was awaiting sentencing and unknown to police, he murdered another young man. In May 1989, he was sentenced to one year in a work release camp. Dahmer was released early for good behaviour and put on probation.



Take Notes

When Jeffrey Dahmer was free, he moved into his own apartment and began murdering more young men. In a 14-month period between 1990 and 1991, he killed 12 victims. He met most of his victims at gay bars and invited them to his place. In his apartment, he would drug, strangle, sexually assault, **dismember**, and finally dispose of the body. He would keep some of the body parts (such as the skull and genitals) of his victims in his refrigerator as souvenirs.

Dahmer was almost caught in May 1991 when one of his victims escaped. In the early morning, a 14-year-old boy was discovered wandering nude in the streets near Dahmer's apartment. When Dahmer realized his victim had left his apartment, he went to look for him only to meet up with two police officers. Dahmer told the officers that the teen was his 19-year-old lover and that they had an argument while drinking. Despite the teen's protests, police brought him back to Dahmer's apartment. Later that night, Dahmer killed and dismembered the boy, keeping his skull as a souvenir.

His Apprehension

Dahmer was apprehended in July 1991 when once again one of his victims, a 32-year-old man, escaped from his apartment. Like his last victim, the 32-year-old was found wandering the streets near Dahmer's apartment. He had managed to escape from Dahmer during a struggle in which Dahmer was trying to put handcuffs on him. The would-be victim led police officers back to Dahmer's apartment. At first, Dahmer was friendly towards police and his place seemed very neat and tidy. However, the officers noticed a terrible odour. When they searched Dahmer's home, they discovered various human body parts in his refrigerator and photos showing his victims in various stages of death.

Trial and Eventual Death

Police discovered that Jeffrey Dahmer had killed at least 17 men. Dahmer admitted to eating the flesh of at least one of his victims. With so much evidence against him, Dahmer pleaded not guilty by reason of insanity. After a lengthy trial in 1991 - 1992, Jeffrey Dahmer was found guilty of 15 counts of murder and was sentenced to 957 consecutive years in prison. In 1994, two years into his sentence, he was beaten to death by another inmate.



Assignment

When you are ready, please complete the assignment for Lesson 2 in the Assignment Booklet.

Did You Know?



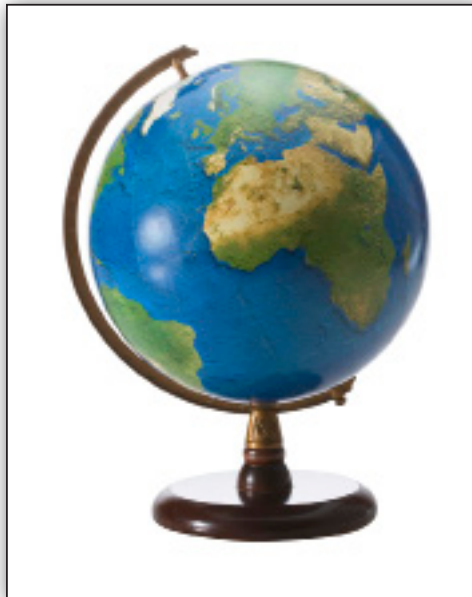
The two police officers who returned the 14-year-old teen boy to Jeffrey Dahmer who soon killed him were fired from the Milwaukee Police Department after their actions became public. However, both officers appealed their termination, were reinstated with back pay, and were named officers of the year by the Milwaukee Police Union. One of the officers went on to become president of the Milwaukee Police Association in May 2005.

Lesson 3: Geographic Profiling

Lesson Objectives: *The student will...*



- explain the use and purpose of a subset of criminal profiling: geographic profiling
- analyze or create a geographic profile of a criminal suspect using mock crime scene data



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General Description



Geographic profiling is a sub-type of criminal profiling. This investigative tool involves analyzing the locations of a related series of crimes to determine the most probable location of an offender's residence or place of work. This strategy is based on the assumption that criminals do not stray far from areas familiar to them, especially routes they travel among work, home, and recreational areas.

Geographical profiling is not intended to solve a crime by identifying immediately the name of a suspect. Its **methodology** is based on the premise that a mathematical analysis of crime scene locations, seen through the perspective of environmental criminology, can increase the efficiency of a police investigation by focusing attention on a specific geographic area in which the suspect might live or work.

History

Since the methodology of geographical profiling began in the early 1990s, it has become an increasingly popular avenue of investigation in complex crimes involving serial offenders. It has



been used in numerous investigations in North America and Europe in recent years. Although the use of *spatial* analysis methods in police investigations goes back many years (think of pushpins stuck in large maps), the formalized process commonly referred to as *geographic profiling* originated in research conducted at the School of Criminology of Simon Fraser University in British Columbia, Canada, in 1989. Its theoretical foundation is rooted in environmental criminology, routine activity theory, and rational choice theory. Advances in crime-pattern theory associated with the work of other researchers at Simon Fraser University led to the search for an effective predictive model of crime.

Research focused on the theory that offenders maintained *buffer zones* around their homes in which they avoided committing crimes to protect their *anonymity*. A second theory, commonly referred to as distance decay, is a mathematical function that describes the path of travel taken by offenders as they search for criminal opportunities. This theory suggests that offenders are not interested in travelling long distances to commit crimes unless they are attempting to achieve a larger potential payoff. In other words, offenders are attracted by the ‘pull’ of a potential target, but are ‘pushed’ from their own neighbourhood for fear of being identified by someone who knows them.

The successful development of an *algorithm* that supported geographic profiling is largely the work of Dr. D. Kim Rossmo, who established its basic principles while completing his Ph.D. in Criminology at Simon Fraser University. Rossmo was a police officer at that time, working as a foot patrol officer in downtown Vancouver at night and attending classes during the day. In 1991, Rossmo created a mathematical formula that expresses two basic principles:

- *least effort*—the principle that humans pursue courses of action only after performing *cost-benefit analyses* in their minds
- *criminal opportunity*—the correlation between *familiarity* and opportunity

For example, a crime can occur only when a ‘motivated’ offender encounters a defenceless victim in the absence of a guardian figure such as police, security, or even other people. In other words, criminal behaviour results from a decision-making process based on a balance between the *probability* of being caught and the amount of effort that is necessary to commit a crime.

Did You Know?



Criminal profiling is the “who”; geographic profiling is the “where”.



© photos.com

Rossmo created an equation and turned it into an **algorithm**. This is the basis of a software program called Rigel and drives the **analytical** work supporting geographic profiling.

$$p_{ij} = k \sum_{n=1}^c \left[\frac{\phi}{\left(|x_i - x_n| + |y_j - y_n| \right)^f} + \frac{(1 - \phi)(B^{g-f})}{\left(2B - |x_i - x_n| - |y_j - y_n| \right)^g} \right]$$



After completing his PhD in 1995, Rossmo was transferred to a full-time geographic profiling unit within the Vancouver Police Department, the first of its kind in North America. This approach was slow to catch on, but it is now used in several U.S., Canadian, British, and European law enforcement agencies. Originally designed for violent crime investigations, it is used also in cases of repeat property crime.

Dr. Rossmo has since left the Vancouver Police Department. He is now a Research Professor at the Texas State University Center for Geospatial Intelligence and Investigation where he works full-time on geographic profiling.

Did You Know?



Russell Johnson, the *Bedroom Strangler*, is a serial killer who murdered 7 women and attacked 17 other women in the late 1970s in Ontario. He was found not guilty of murder by reason of insanity in 1978 and is now serving time at a maximum-security mental health centre in Ontario.

Johnson was married and had one child at the time of his arrest. He worked in an auto factory during the day and as a bouncer at night. Johnson watched his victims sleep for hours before he attacked them. He climbed as high as 13 storeys on the side of a building to attack his victims.



Creation of Geographic Profiles

Tools employed by geographic profilers include various software systems such as Rigel, Predator, and CrimeStat. Input data typically consist of suspect-victim encounter sites, victim or body recovery locations, suspicious vehicle sightings, related public complaints or tips, and residential and employment locations of known suspects. The greater the number of data points one has to work with, the greater the degree of accuracy within the map. This information is entered into a geographic information system (GIS) that creates a three-dimensional surface map, sometimes referred to as a geoprofile. This map depicts the most likely area in which the primary suspect resides.

The use of such software in crime scene analysis involves entering various coordinates into an algorithm to interpret an offender's pattern of behaviour. Geographic profiling assumes that the commission of serial crimes follows an identifiable pattern and that most people commit crimes relatively close to home or work. This system incorporates all methods of transportation a person could access and recognizes that an offender will usually maintain a buffer zone around his or her home to ensure some personal sense of anonymity.

Three-dimensional maps are based on occurrence locations. Areas of red represent *hot spots* of criminal activity. The combination of red and blue areas on the map constitutes what is known as a *jeopardy surface*, a type of topographical map with each 'hot' zone resembling the peak of a volcano. These peaks of criminal activity indicate areas in which an offender is assumed to reside. Investigators can then focus on neighbourhoods or places of work located in the immediate vicinity of these peaks, effectively narrowing the field of suspects who must be interviewed. Although a geographic profile does not produce a suspect's name, it assists investigators by reducing the list of people police interview.

The geographic profile is then superimposed on a street map that pinpoints where the crimes being investigated have occurred. This map is often referred to as containing the 'fingerprints' of the offender's *cognitive* map. The program's predictive power is related to the number of crime sites entered into the program, which means that a suspect's increased activity may increase the chances that he will be apprehended. After the map is created, police may assign surveillance teams to specific areas based on their assumptions of where the offender may strike next, or more commonly, they will use it to reduce the size of an area that must be canvassed for information on possible suspects.

Did You Know?



"This research into geographic profiling was undertaken in an effort to integrate the academic with the practical, the scholastic with the professional. I hoped that by combining science and strategy, experiment with experience, something useful would be produced for the worlds of both the ivory tower and the street."

- Dr. D. Kim Rossmo, *Geographic Profiling: Target Patterns of Serial Murderers*.
Ph.D. Dissertation for Simon Fraser University, 1987, p. xxii.

When entering the data for analyzing the geographical patterns, three principle elements are involved:



- **Distance:** Perceptions of distance of criminal activity from home or work vary from one criminal to another, but they can be influenced by the availability of transportation, the number of barriers (such as bridges or state boundaries), the type of roads, and the criminal's familiarity with the area.
- **Mental map:** A cognitive image of a person's surroundings developed through experiences, travel routes, reference points, and centres of activity is a mental map. The places where we feel safe are taken for granted within our mental maps. Investigators consider that this principle is also true for offenders. As offenders grow bolder, their mental maps may change to produce an increase in the range of their criminal activity.
- **Mobility:** Some criminals are geographically stable (they stay in a certain region) and some are transient (they travel around). Whether they tend toward stability or mobility depends much on their experience with travel, means for travel, sense of personal security, and predatory motivations. For example, Ted Bundy travelled from the U.S. Pacific Northwest to Florida before being arrested by police. He eventually admitted to killing people in ten different states.

Geographic profiling focuses on these three factors in studying predatory behaviour. Criminals are thought to have certain awareness spaces—places where they feel comfortable enough to seek potential victims. Investigators see these to be the offender's primary focus of activity. Serial killers are thought to display highly formatted predation patterns, but those suffering from mental disorders may pose difficult challenges for profilers because of their irrational and **erratic** actions. Richard Chase, also known as the Vampire Killer for his psychotic and highly **aberrant** behaviour that resulted in the murder of six people during a one-month period in 1977-1978, is such an offender. Only because of his reckless behaviour and disregard for being captured were police able to identify him so quickly. When Rossmo applied the software program Rigel **retroactively** to the Richard Chase investigation while testing the algorithm for his doctoral thesis, it showed that Chase's home was within 1.7 % of the total hunting area.

Did You Know?



In countries such as Canada, Italy, the United Kingdom, New Zealand, and Australia, post-partum depression is allowed as a suitable defence against the charge of murder of a child by a mother, provided that a child is less than a year old.

The Use of Geographic Profiling by Law Enforcement



Geographic profiling is used typically in cases of serial murder or serial rape, but it may be used in arson, bombing, and robbery. Geographic profiling helps police investigators prioritize information in large-scale major crime investigations that often generate hundreds or thousands of tips and suspects.

This system has had much success, as in the case of the Southside Rapist who sexually assaulted more than 12 women from 1985 to 1999 in Lafayette, Louisiana. When Dr. Rossmo was called to assist in the investigation, his geographic profile reduced the number of possible suspects to a list of twelve. He was initially disappointed to see that DNA testing cleared all twelve suspects, but the validity of the profile was supported when the culprit was later identified through a tip to police. This individual, who was not on the original list of suspects, actually lived within the topographical hotspot generated by Rossmo's profile map.

Geographic profiling was used with a lesser degree of success in the Beltway Sniper attacks that occurred near Washington, DC, in October 2002. The two killers responsible for the murder or wounding of thirteen people were eventually apprehended after a tip from the public. Rossmo was called to assist in the investigation, but he discovered later that the *transient* lifestyle of the two offenders *negated* the use of 'anchor points' critical to successful geographic profiling. Because both men were living in their car during the shootings, there was no way to identify a pattern of behaviour incorporating travel between home, work, and recreational areas.

John Allen Muhammad, executed in 2009 for his part in the Beltway Sniper murders



AP/Steve Helber

Did You Know?



"Interview the serial killer; what they'll tell you is that the thing really appealing to them was the hunt, the hunt and trying to look for the vulnerable victim."

- Supervisory FBI Special Agent John Douglas: *Mind of a Serial Killer*, 1992, (p.3).

How Police Construct a Geographic Profile



The construction of a geographic profile involves

- study of area maps
- computerized analysis
- examination of the crime scenes
- complete familiarity with the case file
- interviews with investigators and witnesses
- analysis of neighbourhood demographics for both the abduction site and body dumpsite

To assist from a scientific perspective, geographic profilers rely on software that assesses the spatial characteristics of a crime. Using specific measurements, the program makes numerous calculations and produces a topographic map based on the locations of similar crimes. In providing these results, the program takes into account known movement patterns, comfort zones, and 'hunting' patterns exhibited by the suspect.

The case of Clifford Robert Olson, one of the most dangerous serial killers in Canadian history, was another source of information that Dr. Rossmo referred to when he tested his theory of geographic profiling. In 1981, Olson murdered 11 children and teens in the Vancouver area. Rossmo later generated a map of Olson's crimes and pinpointed his address to within a four-block radius encompassing areas of activity related to the abduction of his victims.



© photos.com

Did You Know?



About 80% of murderers in Canada are caught within a year.

CRIME CASE STUDY 5.1: Clifford Robert Olson - The Case of the Missing Lower Mainland Children

Serial Murderer Clifford Olsen, 1981



CP/Nick Didlick



Example

In his dissertation, Dr. D. Kim Rossmo used the Clifford Olson serial homicide case as an example to illustrate his theory of geographic profiling.

Early Years



Take Notes

Clifford Robert Olson was born on January 1, 1940, in Vancouver, British Columbia. Despite being raised in a reportedly stable home with no signs of abuse, at a young age he showed signs of **delinquency**. Olson was known as a bully and a show-off who loved to be the centre of attention. He skipped classes by Grade 4 and failed several grades in school; and it was rumoured he had tortured and killed animals. Olson was a loner who had no close friends and who was frequently in trouble for compulsive talking. He skipped school frequently and was first arrested for theft at age 13. Olson left school at age 16. From then until he was 40 years old, he was convicted of 83 criminal offences. Since his first stint in a correctional facility as a teenager, Olson had spent more than 22 years in prison. At the time of his arrest in 1981, he had spent only four of his adult years outside of prison.

The Murders

Olson owned a construction company and hired young boys and girls by promising them money. Some of these youngsters did legitimately work for Olson; however, many became his victims. Often, he picked victims in the middle of the day offering them a ride or a job. Then, he would either sexually assault and/or kill them.



Olson murdered his first victim in November 1980. He **abducted** a 12-year-old girl in Surrey, British Columbia, strangled her with a belt, and stabbed her repeatedly. The body was found on Christmas Day. In April 1981, Olson killed a 13-year-old girl, but her body was not found until five months later. Next, Olson abducted a 16-year-old boy, smashing the boy's head with a hammer and tossing him into a ditch.

In May 1981, near the time Olson married and his wife gave birth to his only child, he was accused of molesting a five-year-old neighbour girl. However, he was never formally charged due to lack of evidence. In May, just four days after his wedding, Olson abducted and murdered a 16-year-old girl; the following month, he killed a 13-year-old girl.

In July 1981, Olson killed seven youngsters of various ages—the youngest a 9-year-old and the oldest an 18-year-old German tourist. Unlike his first three female victims, two of the six victims were boys. He sexually assaulted all his victims, but he killed them in various ways. Four of the victims he strangled to death; three of the victims he **bludgeoned** to death. Olson dumped most of his victim's bodies in remote locations, but kept evidence from each murder as a souvenir.

Within nine months, Olson had killed two children and nine youths. Initially, the cases were not linked by authorities because the victims were of both sexes, of varying ages, and murdered in various ways. Also, only three bodies had been found at that time; the other seven were tentatively considered probable runaways. However, in late 1981, when police realized that a serial killer was responsible for the deaths, a major investigation was initiated.

Prime Suspect and Surveillance

Clifford Robert Olson became a prime suspect early in the investigation because he lived in the Surrey area and he had a lengthy criminal record. Police brought Olson in for questioning, but they had insufficient evidence to hold him. However, because their suspicions about him were high, he was put under **surveillance**.

Olson was not easy to follow. He would often stop in the middle of a street, make sudden U-turns, or go down one-way alleys, stop, and reverse. Olson also drove continually in various rental cars. In a 3-month period, he travelled more than 20 000 kilometres in 14 different rental cars.

Did You Know?



After Clifford Olson killed 14-year-old, Judy Kozma, 14, he took her address book, called some of her friends and threatened them with taunts such as "You're next."



Attempted Abduction Leads to Arrest

In August 1981, Olson was arrested for attempting to abduct two young female hitchhikers. Olson picked up the girls near Nanaimo, BC, and drove them up a dirt-logging road. Two RCMP surveillance cars followed him and blocked the entrance to the road. Two officers on foot then followed the car until it stopped. When Olson began yelling at one of the girls, police moved in and arrested Olson.

Olson's Controversial Deal

When police investigators began questioning Olson about the string of unsolved murders, he soon offered them a deal. He would confess to all 11 murders and show them where the bodies were if his wife and young son were given \$10 000 for each victim. At first, this deal infuriated investigators. However, because they had little evidence to tie Olson to the murders and because the families of the missing children were desperate, the deal was eventually made.

In January 1982, Clifford Robert Olson pleaded guilty to 11 counts of murder and took police to each of the bodies. Olson was given 11 concurrent life sentences, and his wife and son were given \$100 000.

Clifford Olson shortly after his arrest in 1981



CCP/Nick Didlick

Did You Know?



Clifford Olson wanted \$10 000 given to his family for the location of each of the 11 victims. Police agreed to a payout of \$100 000, and in a strange gesture of goodwill, Olson gave them the location of another of the victims as a "freebie".



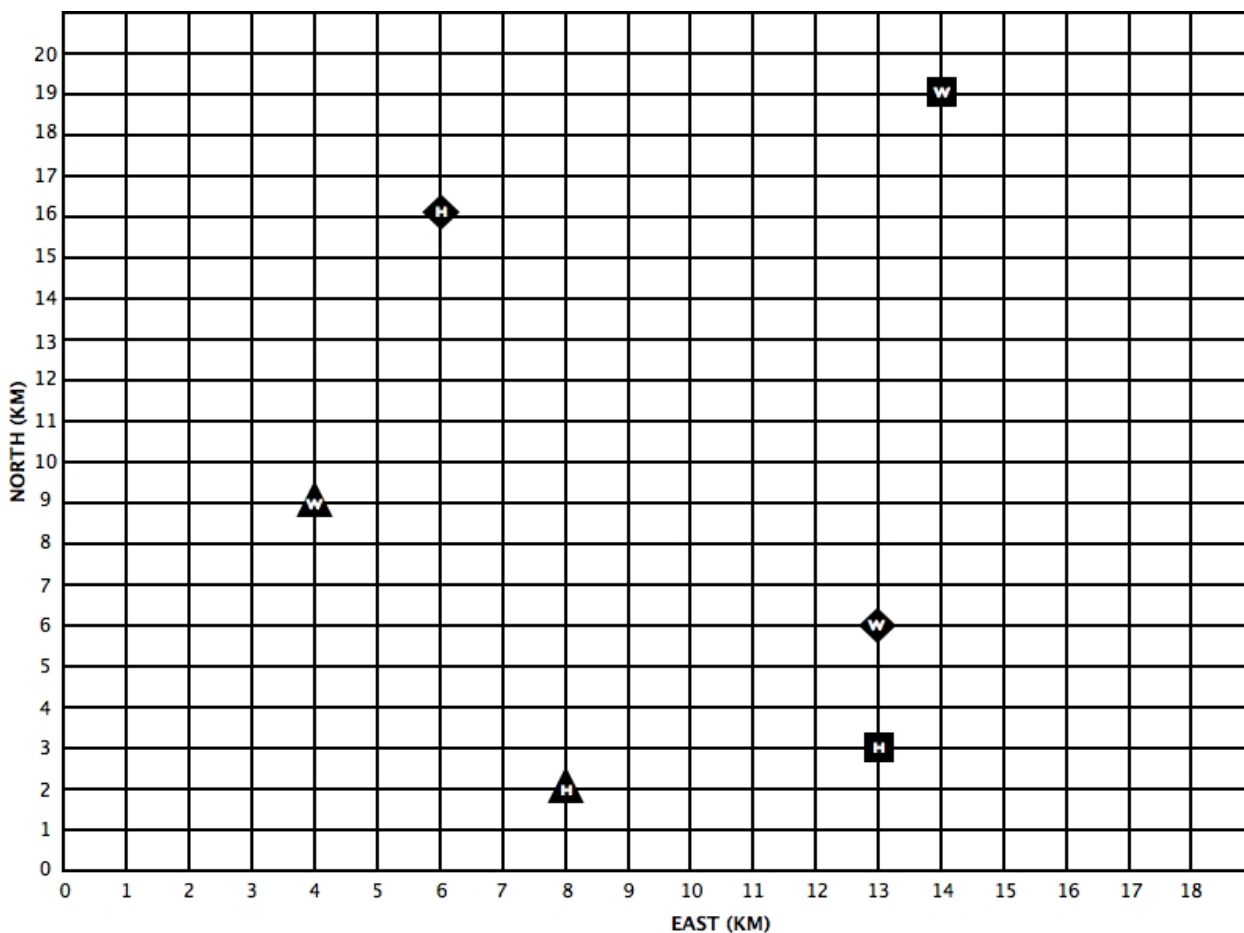
Create Your Own Geographical Profile

You are part of a Police Task Force that is responsible for investigating a series of armed robberies committed within the northeast quadrant of a large Canadian city over the past four months. To date, 14 robberies have occurred, and everyone is concerned that the suspect is becoming increasingly violent. You and your team must identify this person as quickly as possible, but resources are limited and you have very little time to follow up the hundreds of tips received from the public. Therefore, you decide to create a geographic profile map to help shorten your long list of suspects.

Fourteen sets of coordinates have been provided to indicate the locations of the robberies. Plot the following crime location coordinates on the graph paper provided to create a mock geographical profile map. You also have a list of three possible suspects, but only one surveillance team is currently available. Therefore, you need to use the geographic profile to shorten your list of suspects so that you can utilize your resources as effectively as possible.

After you have plotted all fourteen coordinates, determine which of the three suspects lives and works closest to the 'hotspots' identified by the geographic profile.

Robbery Location Coordinates	
x-AXIS (km EAST)	y-AXIS (km NORTH)
4	15
6	9
6	13
7	13
7	18
8	13
9	13
10	12
10	13
11	6
11	16
12	4
13	11
14	17



LEGEND			
	Suspect #1 (Home)		Suspect #1 (Work)
	Suspect #2 (Home)		Suspect #2 (Work)
	Suspect #3 (Home)		Suspect #3 (Work)

Related Question: (Note that the answer to this question does not have to be submitted for marks.)

Which suspect will you ask your surveillance team to follow?

Check your answer in the Module 5 Appendix in the back of this book.



When you are ready, please complete the assignment for Lesson 3 in the Assignment Booklet.

Lesson 4: Criminal Profiling in Homicide Crime Case Studies

Lesson Objectives: *The student will...*



- discuss a historical crime case(s) that involved criminal profiling and/or geographic profiling (such as *Washington Sniper shootings*, *Oklahoma federal building bombing*, *Unabomber*, *Anthrax letters*, *Mad Bomber*, or *Son of Sam*)



Criminal profiling is an investigative tool that is used by police to shorten a list of criminal suspects. A criminal profile identifies some of the major personality and behavioural characteristics of an unknown offender based on a detailed analysis of the crime scene. The assumptions made by criminal profiling experts about the behaviours and personalities of unknown offenders have helped law enforcement in the hunt for suspects responsible for serious crimes.

This lesson focuses upon two crime case studies involving criminal profiling. Based on actual events in history, the first crime case study is *The Railway Killers*; the second is *The BTK Strangler*. You are expected to answer related questions about these case studies in your assignment booklet.



Image courtesy of Sergeant A. Kowalyk, Edmonton Police Service

Did You Know?



“Multiple murderers are rare, but when they do strike, the public and the criminal justice system are both significantly affected. Beyond the violence and tragedy of the crimes, multiple murder produces tremendous fear levels in the community, generates heavy pressures for investigating agencies, and demands significant resources from police, courts and prisons.”

- Dr. D. Kim Rossmo, Geographic Profiling Expert

HISTORICAL CRIME CASE STUDY 5.2: The Railway Killers



Example



Take Notes

John Duffy was a violent rapist who embarked upon a four-year crime spree in 1982, attacking lone women near railway stations throughout various neighbourhoods in London, England. It was first thought that he had committed these crimes by himself, but police eventually concluded that he had an accomplice. They would be unable to establish sufficient proof until 1997, when Duffy admitted that David Mulcahy, a childhood friend, had been involved from the very beginning.

The First Attacks

The first sexual assault occurred in July 1982 when the yet to be identified Duffy and his accomplice attacked and raped a 23-year-old woman near a train station in a neighbourhood outside North London. Eighteen more attacks occurred, mainly at night, near various railway stations in the London area. Most victims were teenage girls attacked while waiting for their train to arrive.

When investigators became convinced that two individuals appeared to be responsible for the violent sexual assaults that terrorized the citizens of London, the pair became known as the *Railway Rapists*. It was later discovered that most of the crimes occurred as close as a five-minute walk from Duffy's house.

Operation Hart

In July 1985, three women were raped on the same night, all within a neighbourhood in North London. The police quickly set up a Task Force, calling it *Operation Hart*. It was the largest multi-jurisdictional police investigation in the United Kingdom since the *Yorkshire Ripper* investigation was concluded successfully several years before.



In August 1985, Duffy happened to be arrested after assaulting his wife. His name was eventually added to the *Operation Hart* computer system as one of many thousands of local men who were being investigated as possible suspects.

In September 1985, another vicious sexual assault occurred. Police thought the attacker's description resembled Duffy. He was brought in for questioning and even participated in a photo line-up. The victim was unable to identify him as the assailant, perhaps due to the traumatic stress she experienced during the crime.



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The First Murders

On December 29, 1985, Alison Day, aged 19, was dragged off a train at Hackney station and repeatedly raped by Duffy and Mulcahy. She was then strangled to death with a piece of rope. This was the first time the two men had killed one of their victims, and police increased the intensity of their efforts to identify the culprit. Day's murder meant that Duffy would now be referred in the media as the *Railway Killer*. Yet, still no physical evidence was available to suggest that two men were carrying out the attacks.

In April 1986, a fifteen-year old female was abducted from a train station in East Surrey. The teenager's body was set on fire after she was raped and strangled, likely to try to eradicate any physical evidence that could identify the attacker.

Duffy was arrested near a local train station less than a month later—this time for the illegal possession of a knife. However, he was released without charge due to a lack of evidence, only to murder another person a week later. In May 1986, Anne Locke, an employee of a local TV station, was abducted as she arrived at a train station just outside London. Her body was found two months later, and the analysis of traces of semen found in her body confirmed that the individual known as the *Railway Killer* was responsible.

In the meantime, police continued to interview each of the nearly 5000 men who had been added to the *Operation Hart* database, requesting a blood sample at the time of each interview. This voluntary process likely was offered to each individual as a means of clearing any doubts about guilt or innocence. Duffy was interviewed on July 17, 1986, but he refused to participate voluntarily in the blood test at that time. He then committed himself to a mental hospital, perhaps as a means of covering his tracks.



The Use of Criminal Profiling

By July 1986, police were desperate to identify the person or persons responsible for this string of horrible crimes. Consequently, they requested the assistance of Dr. David Canter, an expert in behavioural science and professor of applied psychology at Surrey University. At this time, a new concept in criminal investigations was being introduced, referred to by Dr. Canter as “Psychological Offender Profiling” (also known as criminal profiling). This was the first murder investigation in England in which criminal profiling had a significant role. John Duffy, who would later be identified as the *Railway Killer*, was the first person in the history of the English justice system to be identified as a suspect as a direct result of this investigative technique.

To help solve the case, Dr. Canter analyzed large numbers of solved crimes using a **statistical** technique known as **multivariate** analysis. In each case, the behaviour of the criminal (including the choice of victims, personal interaction with them, location and timing of each offence, and content analysis of their speech) was used as a data source. As Dr. Canter examined the details of each crime, he was able to build a profile of the attacker’s personality, habits, and traits.

He then created a profile based on witness statements, crime scene reports, and geographical information. He produced a list of seventeen personality and characteristic traits including environmental clues that the offender might display. For example, he was able to infer that the killer lived in an area of northwest London and had an unhappy married life with no children. Interestingly, Canter relied on his background in environmental psychology to develop concepts such as the **cognitive** map, which would prove useful in understanding offender behaviour. In fact, his research found that most British serial rapists lived within the area in which they committed their crimes.

Peter Sutcliffe with his wife, Sonia

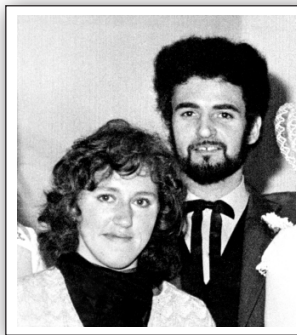


Photo courtesy of PA

Did You Know?



Peter William Sutcliffe was commonly referred to as the Yorkshire Ripper. He was convicted in 1981 of the murders of 13 women in the north of England and attacks on 7 more women from 1975 to 1980.



Below is an abbreviated list of points Canter believed would fit the offender's profile:

DR. CANTER'S PROFILE (PRE-ARREST)	DUFFY CHARACTERISTICS BY COMPARISON (POST-ARREST)
Lived in area where initial crimes occurred	Lived in area
Probably lives with a woman	Recently separated from wife
Mid to late 20's	Late 20's
Right-handed	Right-handed
Semi-skilled or skilled work, isolated	Travelling carpenter
Knowledge of railways	Worked for British Rail
Record for violence	Raped wife at knife point
Loner, very small number of friends	Two male friends, one of whom was David Malcahy
Physically small, feelings of unattractiveness	5'4" with acne
Interest in martial arts	Member of martial arts club
Need to dominate women	Attacked wife
Fantasies about rape and bondage	Tied wife up before sex
Fascination for weapons, especially swords and knives	Kung Fu weapons at home
Fantasies about sex and violence	Hard-core porn videos
Keeps souvenirs from crimes	Kept victims' door keys



Duffy Becomes Main Suspect

As the process of creating an offender profile ended, a fourteen-year-old schoolgirl was raped in a park in October 1986. When the psychological profile created by Dr. Canter was cross-referenced with the police database of all possible suspects, the computer generated a match for John Duffy.

Duffy was placed under police surveillance. He was arrested on November 7, 1986, when he was seen stalking a woman in a park. He was questioned about his involvement in the numerous rapes and murders committed over the past four years. He offered a weak alibi involving tales of amnesia. With sufficient forensic evidence to support a successful prosecution, Duffy was charged with three murders and seven counts of rape. Police suspected that he had not committed the offences alone, but Duffy refused to cooperate any further.

Dr. Canter's profile of the killer was accurate in 13 of 17 points. He attributed the success of his technique to an understanding of how a criminal leaves behind 'evidence of his personality' through his actions in relation to a crime, including specific behaviours characteristic of that person. Consistent behaviours typical of the person's social group also provide information that can be used to develop a profile.

According to Dr. Canter, to build a profile of an offender from 'the bottom up' is possible. By reviewing a wide range of associated factors and operating under the premise that people behave typically consistently, the analysis of behaviour patterns observed over time can provide clues about a serial offender's ordinary behaviour.

Conclusion

Duffy went to trial in February 1988. He was convicted of two murders and four rapes, but he was acquitted on the remaining charges, including the murder of Anne Locke. Duffy later revealed to a psychologist that he had not been working alone when he committed his **heinous** crimes. However, he revealed no further details until 1997 when he implicated childhood friend David Mulcahy, a married father of four who was later convicted and sentenced to life in prison. This marked the end of the lengthy and determined search for the *Railway Killers*, one that made effective use of criminal profiling.



HISTORICAL CRIME CASE STUDY 5.3: The BTK Strangler



Example

Dennis Lynn Rader murdered at least 10 people in and near the city of Wichita, Kansas, between 1974 and 1991. He became known as *The BTK Strangler*, which stood for ‘Bind, Torture, and Kill’, a name that he had originally passed to the media and police through a wide variety of written correspondence.



Take Notes

First Killings: 1970s

Rader’s first victims were four members of one family (Joseph Otero, his wife, and their two children) who were murdered in their home in January 1974. In April 1974, Rader struck again, using his preferred method of attack by gaining entry to the victim’s home. He tied Kathryn Bright and her brother Kevin, and then strangled her to death. Rader then shot Kathryn Bright’s brother several times as they fought, but Kevin Bright survived. The police were unable to locate the killer from the description he provided.

In 1977, in a period of nine months, Rader murdered Shirley Vian and Nancy Fox in their own homes. He used the same method of binding and torturing to kill these two victims.

Possibly, he had other intended victims, but the murders stopped for a time. Then, two years later in 1979, Anna Williams narrowly escaped death when she returned home from work much later than expected. Rader had broken into her home, but apparently he gave up on her return that evening. He later sent an angry note to her stating “...*be glad you weren’t here, because I was.*” He included one of her scarves with the letter.



Letters to Police and Media

Rader seemed to derive perverse pleasure from sending taunting letters to both police and various news outlets. He sent notes and letters from 1974 to 1979. For example, in October 1974, a letter describing in detail the murder of the Otero family had been left in an engineering book in the Wichita Public Library. In early 1978, he sent a letter to a Wichita TV station in which he claimed responsibility for the murders he had committed. This letter identified the *BTK Strangler* name, announcing that a serial killer was loose in Wichita. A poem was also enclosed, written as a form of macabre tribute to the murder of Nancy Fox. However, nothing was heard from BTK for the next several years. During that time, local police created a Task Force and spent thousands of hours searching for the identity of the *BTK Strangler*. They used various principles from science and followed up on the realization that all murders had occurred within a radius of approximately 8 km.

By 1988, the trail had gone cold. However, police received a letter from someone claiming to be the *BTK Strangler*. The author referred to a recent murder but denied responsibility while noting that it had been performed admirably.

Criminal Profiling Involvement

In 1997, Robert Ressler, a former FBI agent, helped outline a profile of the *BTK Strangler*. Ressler thought the man may have been a graduate student or a professor in the criminal justice field at the local university, was most likely in his mid-to-late-20s at the time of the killings, and was an avid reader of books and newspaper stories concerning serial murders. Additionally, because his pattern of killings had not been seen in Wichita since the '70s, it was assumed that he had likely left the area or had died.

In August 2000, Dr. Deborah Schurman-Kauflin, President of the Violent Crimes Institute, created a partial profile of the killer based on limited information. Among her insights was a chilling statement about the mindset of *BTK Strangler*:

This is not a person who would stop killing on his own. There are only three reasons he would stop: death, prison, or he is too disabled or sick to kill. This is a compulsive psychopath who enjoys killing and will not give it up.

**Dennis Rader,
The BTK Strangler at his trial in 2005**



Photo by Bo Rader/Wichita Eagle/KRT/ABACAPRESS.com



Schurman-Kauflin's profile of BTK was updated in 2005 (just prior to the *BTK Strangler's* arrest) to provide a more detailed description of his character traits and behaviours:

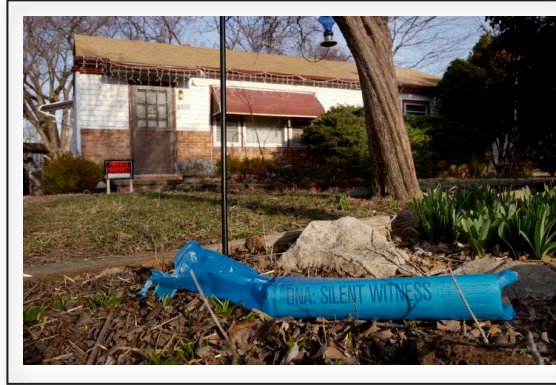
- Divorced white male who now would be in his 50's
- Sad, lonely, bored
- Has a normal appearance and fits in well with the people who live in Wichita
- Drives a non-descript pickup truck or car, most likely American-made
- Was and is strong and enjoys using his hands
- Can be charming and disarming when he chooses
- Prefers his own company because he feels superior to everyone
- Lives in a lower to middle-class area
- Not known as a criminal
- Sane, but a psychopath
- Has a strong dislike of women and views them with disdain
- Enjoys playing puppet-master and would prefer killing and manipulating others to almost anything
- A consummate liar and manipulator
- Enjoys being discussed in the media and takes delight in people guessing about him
- Has the world at the end of his string, but his problem is that to be truly heard, he has to be caught

Did You Know?



Strangely, the BTK Strangler was able to carry out what seemed to be a normal life during his decades of a reign of terror. He was on both the Sedgwick County's Board of Zoning Appeals and the Animal Control Advisory Board. He was president of his Christ Lutheran Church Congregation Council and a Cub Scout leader.

Front Yard of Dennis Rader's House



AP / Charlie Riedel



Letters and Packages from the *BTK Strangler*

In March 2004, *BTK Strangler* began a series of communications that ultimately led to his arrest in February 2005. The *Wichita Eagle* newspaper received a letter written by a person believed to be *BTK Strangler* who claimed responsibility for the murder of Vicki Wegerle in September 1986. This murder had not been attributed previously to *BTK Strangler*, but several photographs of the crime scene and a photocopy of the driver's licence of Vicki Wegerle's were included with the letter, indicating that whoever had sent it had intimate knowledge of the crime. Subsequent letters, notes, and packages were sent throughout 2004 while police encouraged BTK to continue to communicate, hoping that he would make a mistake to identify himself.

In December 2004, Wichita police received another package from the *BTK Strangler*; it contained the driver's licence of Nancy Fox. It had been stolen from her residence at the time of her murder in 1977. In February 2005, postcards were received by a local TV station and were followed by further writings related to the 1974 murders of a certain member of the Otero family.

Then the *BTK Strangler* made an error. In February of 2005, he sent a padded envelope containing a computer disc to a TV station in Wichita. On this disc, police found *metadata* embedded in a Microsoft Word document that identified the Christ Lutheran Church and that showed the document was last modified by "Dennis". Investigators then discovered that the president of the Christ Lutheran Church council was Dennis Rader.

Arrest and Confession

Police immediately began surveillance of Rader and obtained a warrant for the medical records of Rader's daughter. Subsequently, a tissue sample was obtained from her and tested for DNA. It provided a familial match with semen found at an earlier *BTK Strangler* crime scene. This evidence, combined with other pieces of information gathered prior to and during the surveillance, gave police the grounds to arrest Rader in February 2005. He was taken into custody without incident. He talked to the police for several hours, confessing almost immediately. His confession and subsequent interviews with police filled almost a dozen DVDs.



During his lengthy interviews with police, Rader appeared to detach himself from his victims, describing them as his “projects”, discussing in detail how he had “put them down”. Rader also described the contents of his “hit kit”: a briefcase or bowling bag containing handguns, tape, rope, and handcuffs. He also carried extra clothing that he could change into after committing a murder.

Rader also provided insight into how he chose his victims. He would first wander the city until he found potential victims; he would then stalk them for some time. Then, he would break into the victim’s home when no one was home, cut the phone line, and hide until his victim came home. Rader then bound, tortured, and killed his victims. Usually he strangled them until they lost consciousness, but he would revive them just to strangle them again. He would repeat the pattern, becoming sexually aroused at the sight of their struggles. Finally, Rader would strangle them to death and ejaculate into an article of their clothing, usually underwear.

All victims except one lived in and around central Wichita. Rader lived on the same street as one of his victims.



Conclusion

Rader pleaded guilty in 2005, giving a graphic account of his crimes in court. By this time, Rader had openly admitted to two other murders that the *BTK Strangler* had not originally been suspected of committing: Marine Hedge in 1985 and Dolores David in 1991.

In August of 2005, Rader was sentenced to serve 10 consecutive life sentences (one life sentence per victim) without possibility of parole for 175 years. The police investigation concluded with the statement that Rader was not responsible for any other murders.

Although criminal profiling played a minor role in the search for the *BTK Strangler*, this story demonstrates the need for an objective, balanced approach to serial crime investigation based on the ease with which a serial killer can blend into conventional society.

Dennis Rader, The BTK Strangler



Photo by Bo Rader/Wichita Eagle/KRT/ABACAPRESS.com

When you are ready, please complete the assignment for Lesson 4 in the Assignment Booklet.

Forensic Studies 35

LDC 3569

Module 6

Forensic Anthropology and Forensic Entomology



Module 6: Forensic Anthropology and Forensic Entomology (Bones & Bugs)



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Overview

Sometimes, all that is left from a violent crime are the skeletal remains of the victim. Careful analysis of bones can reveal many important clues about the identity and/or the type of injuries that caused the death of a victim. The scientific examination of the skeletal remains from a crime scene is known as *forensic anthropology*.

A dead body begins to *decompose* immediately upon death. The rate at which the human body decomposes depends upon the surrounding environment and the micro-environment of the body. If the remains of a victim have been left outside, insects and *micro-organisms* accelerate decomposition through *infestation*. Forensic *entomology* is a specialized field of forensic science in which the analysis and identification of insects found upon a victim's body can lead to an approximation of the time of death and the cause of death.

- Lesson 1 of this module discusses forensic anthropology specifically. Then, the lesson shows how human bone can be distinguished from animal bone. Students examine how forensic anthropologists determine both *ancestry* and *sex* from skeletal remains.
- Lesson 2 explores how various types of force or various types of weapons can leave specific types of bone fractures.
- Lesson 3 focuses upon how forensic entomologists use information about insect *succession* to help determine the time and cause of death of a victim whose body is partially decomposed.
- Lesson 4 examines the details of two historical crime cases and one fictional crime case involving forensic anthropology and forensic entomology.

Module Learner Objectives

By the end of Module 6, you should be able to...

- recognize that in the field of forensic anthropology information about the victim of a crime and the nature of the crime itself is determined from unknown skeletal remains
- understand that a forensic anthropologist attempts to determine the following information from unknown skeletal remains: whether they are human or non-human, number of individuals found, time of death, sex of individual(s), ancestry of individual(s), stature of individual(s), and cause of death
- describe some of the basic skeletal differences between human and animal bones (such as ribs and upper and lower limbs)
- state some of the basic skeletal differences between humans of various ancestries or races (such as **African**, **European**, and **Asian**)
- identify some of the basic skeletal differences between female and male remains
- perform a research study that compares the size and length of various bones in males and females
- describe how different types of force (such as compression, bending, torsion, tension, shearing) can **fracture** human bones in specific ways
- explain how various types of trauma (such as blunt force, projectile, sharp force, strangulation) cause specific types of damage to human bone
- describe how various type(s) of weapons can cause damage to human bone
- recognize that the field of forensic entomology helps investigators to determine on the basis of insect infestation the approximate length of time a body has been left in an area
- understand that each environment has a unique set of **native** insect species and that each of these insects has a unique life cycle and exhibits unique behaviors
- analyze a historical crime case(s) or fictional crime case(s) that involves forensic anthropology and/or forensic entomology

Did You Know?



The first criminal case in which methods of forensic anthropology were used was in the United States in 1849. Two anatomy professors were asked to examine skeletal remains found in a septic tank and furnace of an anatomy lab where Dr. George Parkman, a missing physician, worked. Analysis of the remains confirmed that the bones were the remains of the missing physician. This information led to the conviction of Dr. John W. Webster, a Harvard chemistry professor, who owed the victim money. Webster had killed and dismembered Parkman rather than pay the debt.

Source: Byers, Steven N. *Introduction to Forensic Anthropology; A Textbook*. Allyn & Bacon, 2002. (p. 5).

Lesson 1: Determining Ancestry and Sex from Human Skeletal Remains

Lesson Objectives: *The student will...*



- recognize that in the field of forensic anthropology information about the victim of a crime and the nature of the crime itself is determined from unknown skeletal remains
- understand that a forensic anthropologist attempts to determine the following information from unknown skeletal remains: whether the remains are human or non-human, number of individuals found, time of death, sex of individual(s), ancestry of individual(s), stature of individual(s), and cause of death
- describe some of the basic skeletal differences between human and animal bones (such as ribs and upper and lower limbs)
- state some of the basic skeletal differences between humans from various ancestries or races (such as African, European, Asian)
- identify some of the basic skeletal differences between female and male remains
- perform a research study that compares the size and length of various bones in males and females



Image courtesy of Dr. Sue Black, Professor of Anatomy and Forensic Anthropology, University of Dundee

Did You Know?



"Forensic anthropology is specialized and noble. It is science in the service of humanity."

Source: Dr. Stanley Rhine, PhD., Foreword in *Introduction to Forensic Anthropology; A Textbook*. Allyn & Bacon (2002).

Defining Forensic Anthropology



Anthropology is the study of the biological and cultural aspects of humankind in any place at any time. Two sub-fields of anthropology are

- ***cultural anthropology*** – the observation over time of norms, customs, political, economic, and religious systems in a culture
- ***physical or biological anthropology*** – the identification and interpretation of human evolution and variation in humans

Forensic anthropology is a specialized field of forensic science in which the goal is to analyze and interpret the human remains of unexplained deaths. Forensic anthropologists conduct their work by analyzing human skeletons or decomposing remains to extract as much information about the person and the circumstances surrounding his or her death. Forensic anthropologists provide this valuable information to a medical examiner, ***pathologist***, or law enforcement officer. A forensic anthropologist analyzes remains according to the following list of questions:

1. Are the remains skeletal?
2. Are the skeletal remains human or animal?
3. Are the skeletal remains modern or historical?
4. How many individuals are present?
5. Is there evidence of time since the death?
6. What is the age, sex, stature, and ancestry of each individual?
7. What are the individualizing features of the remains?
8. Is there evidence that can aid in establishing the cause and manner of death?

The forensic anthropologist creates an ***osteobiography*** (bone story) about the deceased remains they examine. This osteobiography includes a description of age, sex, ***stature***, ancestry, and individualizing features (such as previous illnesses, genetic abnormalities, and trauma). Determining the age, sex, stature, and ancestry helps to determine if the individual is a missing person. Identification of individualizing features may help to positively identify a person. Forensic anthropologists also look for signs of recent trauma that may have been the cause of death.

Using Bones to Determine Ancestry



A forensic anthropologist may be able to help determine the ancestry of a victim through an examination of the skull and other parts of the skeleton. Determining the ancestry of a victim can help law enforcement officials determine the identity of an unknown corpse. Certain common traits can be found in the facial features of the skulls of individuals that share the same ancestry. The human skull has the greatest number of these unique traits.

Some skull characteristics are more common in some ancestral groups than in others. To use three general ancestral groups is common practice: African, Asian, and European. However, in the past more than twenty groups have been used.

1. **African** – includes African, Caribbean, and African-American ancestry
2. **Asian** – includes those of Chinese, Japanese, Inuit and Native ancestry
3. **European** – originally from the Caucasus region found between the Black Sea and the Caspian Sea; includes Europeans, East Indians, Pakistanis, and Arabs

The determination of ancestry from skeletal remains is controversial because only a few skull characteristics are unique to one particular ancestral group. In addition, the assessment of ancestry from skeletal remains is not highly reliable because populations are so intermixed today. Consequently, to determine ancestry with any degree of certainty is difficult; thus, forensic anthropologists tend to make suggestions rather than conclusions about which ancestral group may be evident from the skeletal remains they are examining.



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Did You Know?



“Presently, there is a debate within anthropology concerning the non-existence of race. To avoid this debate and controversy, the terms race and ethnicity are avoided in favor of the term ancestry to describe the genetic background of persons.”

Source: Dr. Steven N. Byers., Foreword in *Introduction to Forensic Anthropology; A Textbook*. Allyn & Bacon (2002).

Comparison of Cranial Features

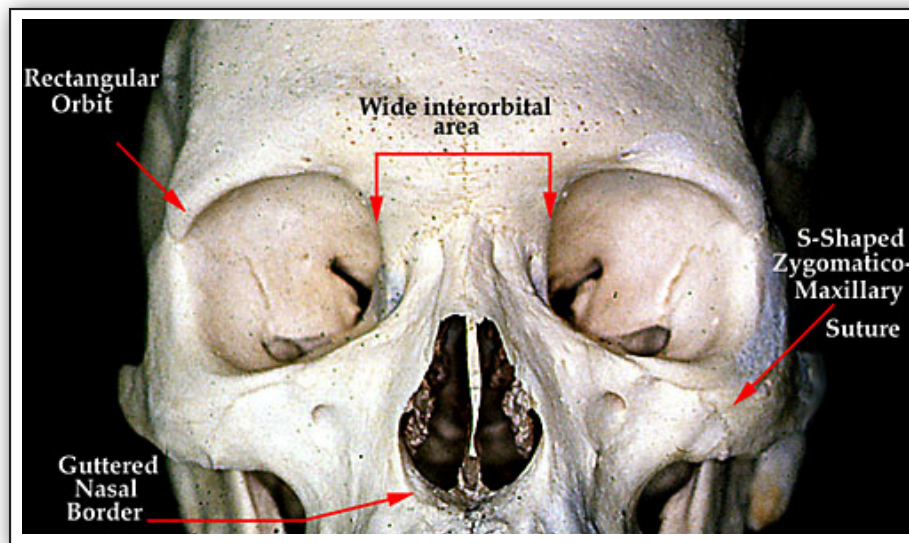


Take Notes

Several cranial features have been found to be distinctive in various ancestries. Of primary significance are two regions of the human skull: the **orbits** and the **nasal** region. The skull has two orbits that house the eyeballs. The nasal region is the area in and around the nose.

An individual with African ancestry is more likely to have orbits that are rectangular in shape and a nasal border that is **guttered**. Additionally, the space between the eyes and nose (interorbital area) tends to be wider than in other groups.

Skull of an Individual of African Ancestry

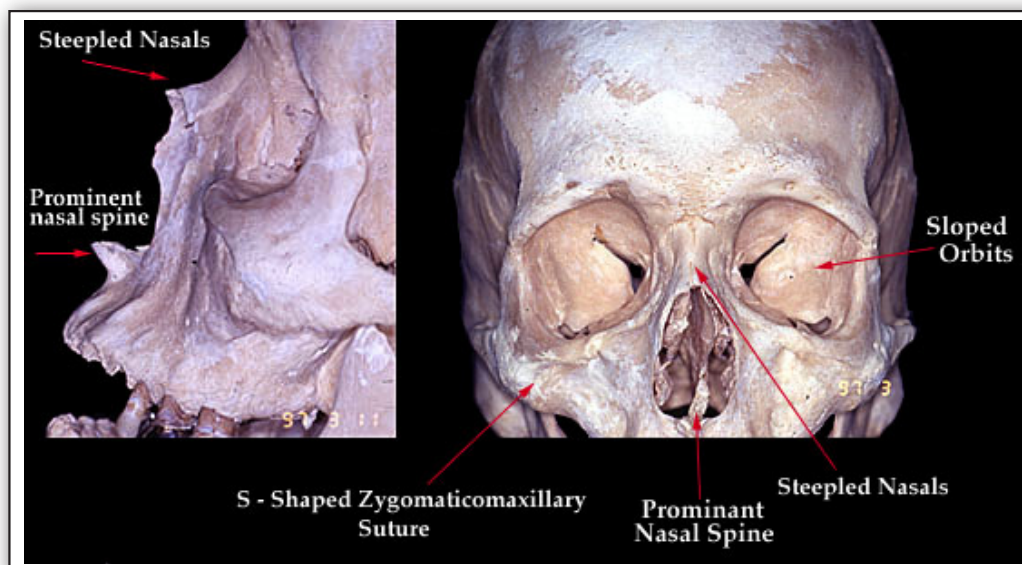


University of Utah Health Sciences Center Osteointeractive website

European Ancestry: Cranial Features

An individual with European ancestry tends to have orbits that are sloped. Another distinct feature of European individuals is the prominent nasal spine and **steepled** nasals.

Skull of an Individual of European Ancestry



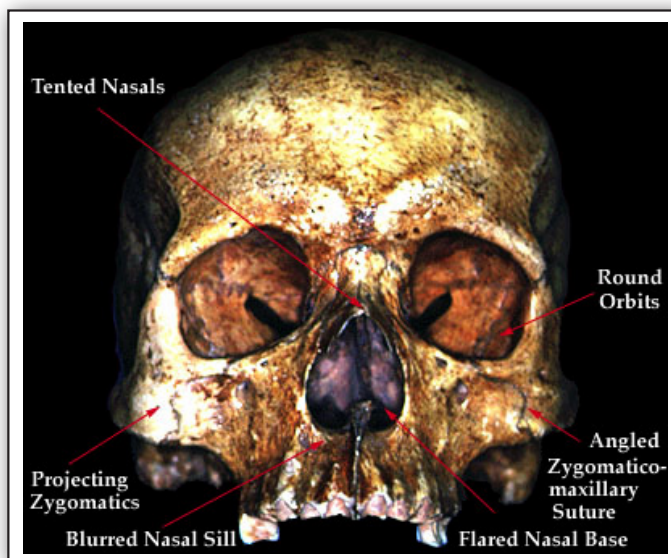
University of Utah Health Sciences Center Osteointeractive website



Asian Ancestry: Cranial Features

An individual with Asian ancestry tends to have round orbits. Often the base of the nasal area of Asian individuals is flared meaning that it appears to widen.

Skull of an Individual of Asian Ancestry



University of Utah Health Sciences Center Osteointeractive website

Did You Know?



“Forensic anthropologists do not have the luxury of debating the issue of *race* and *ethnicity*; rather, they must arrive at an assessment of this demographic characteristic to aid the police in their identification process.”

Source: Dr. Steven N. Byers., Foreword in *Introduction to Forensic Anthropology; A Textbook*. Allyn & Bacon (2002), p.150.

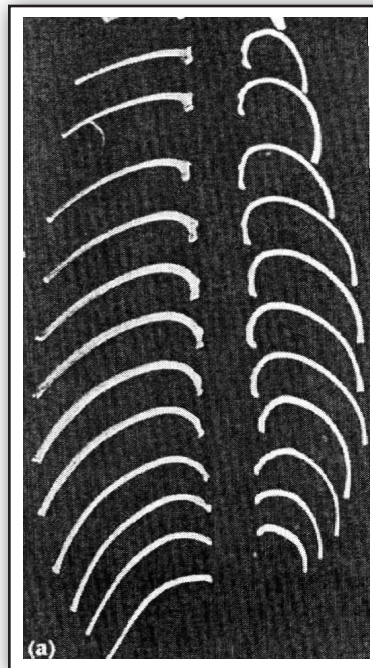


Distinction between Human Bone and Animal Bone

If partial skeletal remains are found, especially when no skull is apparent, animal bones may be mistaken for human bones. Distinguishing bones as human or animal may be difficult sometimes.

1. **Ribs:** The inexperienced observer might confuse sheep rib bones as human ribs because they are slender and similar in size. However, human rib bones tend to be C-shaped, while most animal ribs tend to be more linear and/or straight (see photograph below). Humans normally have 12 pairs of ribs. However, some may have one more or one less. Most animals have more than 12 pairs of ribs. Sheep have 13 pairs.

Animal Rib Bones and Human Rib Bones



The ribs of a sheep (left)
as compared to human
ribs (right)

*Steven N. Beyers, Introduction to Forensic Anthropology: A Textbook 1st edition © 2002.
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Did You Know?

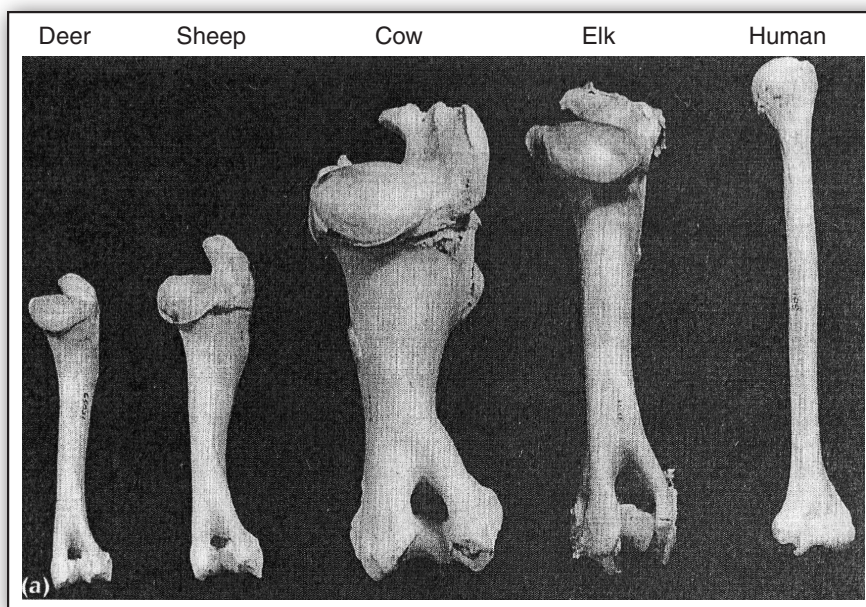


“Crime is terribly revealing. Try and vary your methods as you will, your tastes, your habits, your attitude of mind, and your soul are revealed by your actions.”

- Agatha Christie (English Detective, Novelist, and Playwright, 1890-1976)



Examples of Upper Arm or Limb Bones



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2. **Upper arm bones:** Human upper arm bones (**humerus**) are used for lifting and, thus, tend to be smaller and more slender than animal limb bones. This is because humans are bipedal. Bipedal animals move using two legs; thus, the weight of the body is not carried on the bones within the arms. Most mammals are quadrupeds, which means they bear their weight on four limbs when they move.

In addition, the upper arm bones of a human have a smaller **tubercle** on the upper part of the bone. This is because a human shoulder joint is less stable because it lies in a relatively shallow shoulder blade. In other animals, the strong **ligamentation** around the upper part of the limb bones due to larger muscle attachment sites creates a larger tubercle with projections. (See the photograph on next page.)

Did You Know?

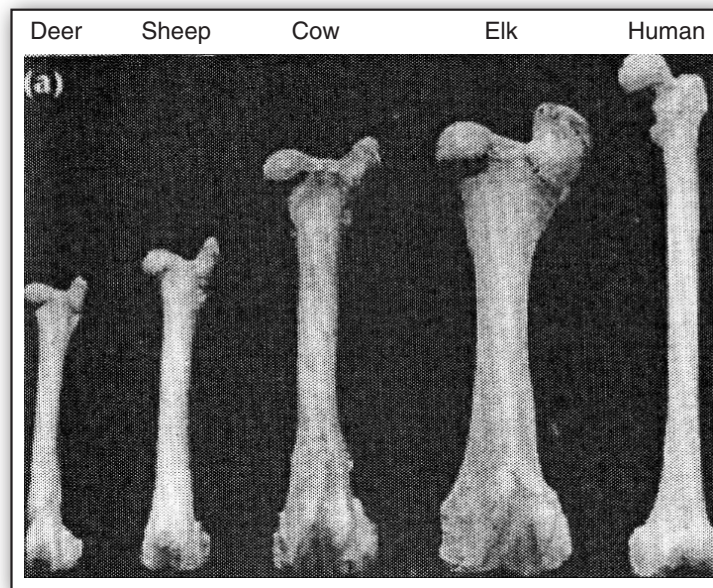


Interestingly, two animals that have skeletal features that are remarkably similar to humans are the North American black bear and the domestic pig.

To the untrained eye, the bones in the paws of the North American black bear can be mistaken easily for human finger bones. Similarly, pig molars appear identical to human molars.

Source: Steven N. Beyers, *Introduction to Forensic Anthropology: A Textbook* (p. 67, 71). Allyn & Bacon (2002).

Examples of Leg Bones



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3. **Upper leg bones:** The large upper leg bone (**femur**) of a human has a rounded head with a relatively long neck on its upper region. This head sits within the hip to create a stable joint for movement on two legs. The head of an animal femur is less spherical. A **trochanter** is located at the same end of the femur as the head. Trochanters are bony bumps to which muscles are attached. Each bone is oriented so that the head is on the left and the trochanter is on the right. Animal bones have substantially larger trochanters due to larger muscle attachment sites and because this joint is positioned more sideways (lateral). These larger muscles and unique joint positioning allow animal movement on all four limbs.

Using Bones to Determine Sex of an Individual

Clues in human bones can help determine the sex of skeletal remains. This is important because it helps establish the identity of the deceased individual. By assessing multiple characteristics in a skeleton, the sex of a person can be estimated. However, in some cases the sex of a person cannot be determined easily because of human variation. The most important and reliable part of the skeleton for determining a person's sex is the **pelvis**. The skull may also be used, but variation in skulls may produce conflicting results.

The most obvious difference between the human male and female skeletons is the **pelvic** region. Numerous features of the female pelvis distinguish it from the male pelvis; however, in general, the female pelvis appears shorter and wider than the male pelvis. In addition, the pelvic region of the male is usually larger and more rugged than the smaller and slighter female pelvic region.

Human Female Pelvis



Human Male Pelvis



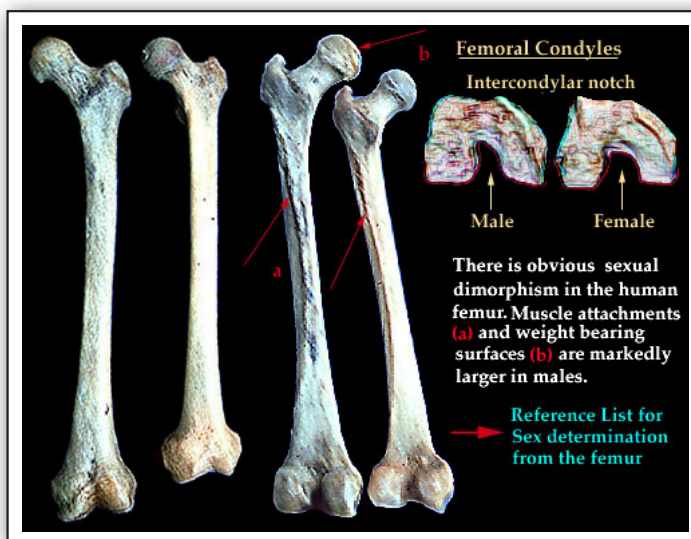
*Features of Selected Bones website, ©David B. Fankhauser, Ph.D., Professor of Biology and Chemistry,
University of Cincinnati Clermont College*



Take Notes

In general, males tend to be more muscular than females. Therefore, the muscle attachment sites and weight-bearing surfaces on male **limb** bones tend to be larger and more pronounced. Notice in the photograph below that the upper leg bone (femur) of the male (right) has a number of large ridges where the muscles attach while the female femur does not appear to have these ridges.

Femurs from a Human Female (left) and a Human Male (right)



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Did You Know?



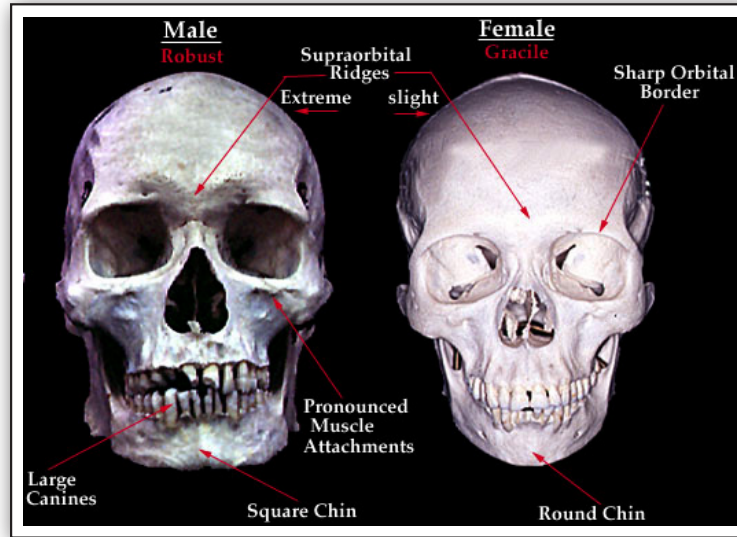
"It is clear that race does mean different things to different people. In the context of forensic anthropology, the term race is unambiguous."

Source: Dr. Stanley Rhine, PhD.. (Forensic Anthropologist - University of Mexico).



The human skull differs in several distinct ways in males and females. The photograph below shows two extreme examples of cranial sex differences.

Human Skulls: Male and Female



University of Utah Health Sciences Center Osteointeractive website

- The **supraorbital** (above the eyes) ridges in the forehead of a female tend to be slight (gracile) and small while the supraorbital ridges of a male tend to be extreme.
- Below the eyes in a male skull are pronounced ridges to which the facial muscles attach. The ridges below the eyes in a female skull tend to be slighter.
- The chin of the male is often square and angular while the chin of the female is often more curved and round.
- On average, the teeth of males tend to be larger than the teeth of females.

Did You Know?



Babies are born with approximately 300 identifiably separate bones. Many of these fuse during growth. As a result, adult human skeletons normally have an average of 206 bones.



Related Experiment (Optional Activity):

Anthropometric Analysis: Body Size Comparison of Males and Females

Purpose: To compare and contrast the measurements of various body regions of human males and females

Materials:

- tape measure or metre stick or ruler
- calculator
- graph paper
- 4 to 6 male volunteers
- 4 to 6 female volunteers

Procedure:

1. Take measurements of various body parts of at least 8 to 12 different people – at least four females and at least four males. (Include yourself in one of these two groups.) This may be challenging, but try to have all your volunteers of a similar age. If your volunteers are under age 18, choose those within an age range of 2 years. If your volunteers are over the age of 18, choose an age range of 5 to 10 years.
2. Use your tape measure, metre stick, or ruler to measure each of the following lengths on each of your test subjects:
 - hip to sole of foot (cm)
 - length of foot (cm)
 - overall height (cm)
 - length of hand (cm)
 - head circumference at forehead (cm)
 - shoulder to longest finger (cm)
3. Record all these measurements in the observation charts provided.
4. Create a bar graph using the data collected by placing the average skeletal measurements on the x-axis and distance (cm) on the y-axis.
5. Conclude by answering the related lab inquiry questions.

Observations Chart #1

Measurements of Various Body Regions of MALE Subjects

(all measurements in centimetres)

Name of subject	Age (years)	Hip to Foot (cm)	Length of Foot (cm)	Overall Height (cm)	Length of Hand (cm)	Head Circumference (cm)	Shoulder to Longest Finger (cm)
Average							

Observations Chart #2

Measurements of Various Body Regions of FEMALE Subjects

(all measurements in centimetres)

Name of subject	Age (years)	Hip to Foot (cm)	Length of Foot (cm)	Overall Height (cm)	Length of Hand (cm)	Head Circumference (cm)	Shoulder to Longest Finger (cm)
Average							

[illegible]

Lab Inquiry Questions: (Note that the answers to these questions do not have to be submitted for marks.)

1. What specific body regions had similar measurement averages on both male and female test subjects?
2. What specific body regions had different measurement averages on both male and female test subjects?



Check your answers in the Module 6 Appendix in the back of this book.

When you are ready, please complete the assignment for Lesson 1 in the Assignment Booklet.

Lesson 2: Determining Traumatic Injuries from Skeletal Remains

Lesson Objectives: *The student will...*



- describe how different types of force (such as compression, bending, torsion, tension, shearing) can fracture human bone in specific ways
- explain how various types of trauma (such as blunt force, projectile, sharp force, strangulation) cause specific types of damage to human bone
- describe how various type(s) of weapons can cause damage to human bone



Dr. Bradley Adams: Forensic anthropologist for the city of New York
Kambiz Kamrani (anthropology.net)

Did You Know?



"What lies deepest within all of us, at our center; that which is the last of us ever to be cut, burned, disassembled, or dissolved: that which is strongest, hardest, and least destructible about us; our firmest ally, our most trustworthy companion, our longest surviving remnant after we die: our skeleton."

Dr. William Maples (Forensic Anthropologist)

Source: William R. Maples & Michael Browning: *Dead Men Do Tell Tales: The Strange and Fascinating Cases of a Forensic Anthropologist*. Random House, Inc. (1997)

Inferring the Cause of Death from Skeletal Remains



After a violent death, such as a homicide, a suicide, or an accident, bones may display signs of traumatic injury because these manners of death often result in skeletal damage. When skeletal remains are found, the cause of death can be **inferred** by a forensic anthropologist only after the examination of the bones. Because only bones remain, details of the type of trauma the victim suffered are unknown. Therefore, a forensic anthropologist will state that the trauma is *consistent with* a certain type of injury that could lead to death. For example, if a stab wound to the torso is observed, the existence of this type of wound does not prove that stabbing was the cause of death. A forensic anthropologist will likely state that *the cause of death is consistent with death by stabbing*. An inference is made rather than a confirmation because the person could have died from other causes before or after he or she was stabbed.



© photos.com

When a forensic anthropologist begins examining remains for trauma, he or she looks for **fractures** in the bone. A fracture is simply a break in the bone. There are many different types of fractures eg. simple, compound, or comminuted (bone that has been pulverized into fragments). The type of bone fracture depends on the direction from which force is applied. Five directions of force cause bone fractures: compression, shearing, bending, torsion, and tension.

Did You Know?



Forensic Fact: Killers are afraid of getting caught; thus, the longer it takes to dispose of a body, the greater the chance of being spotted. Even in the wilderness, murderers tend to dump their victims near a road.

Source: Hopping, Lorraine Jean. *Dr. Diane France: Bone Detective – The Story of Forensic Anthropologist*, (p.46). Scholastic Inc.-Joseph Henry Press, Washington DC (2005).

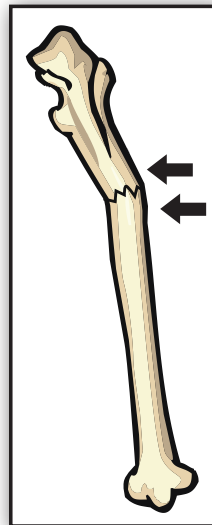


1. **Compression** - a force that pushes inward from the end of a bone. Fracture lines will often be numerous, wide-reaching, and tend to *radiate* from the point of impact. This type of force is most often applied to the skull. The shape of the displaced bone will likely match the instrument used to create the wound. Example: aircraft-related spinal injuries.



©ADLC

2. **Bending** - the most common type of force that causes traumatic injuries. This type of force impacts a bone at a right angle causing a triangular break usually through its cross section. A bending force tends to cause fracture lines at the point of impact or on the side opposite from the break. Usually complete breaks or fractures occur in adults; in children, inflections or 'green-stick' fractures occur.

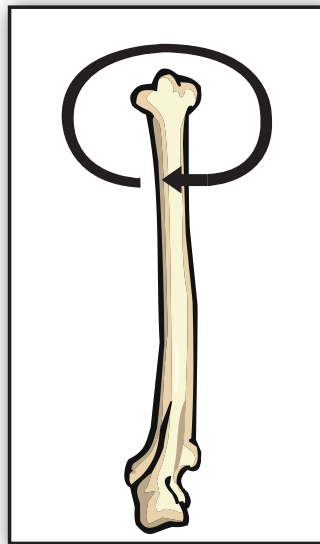


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The most common traumatic fracture caused by a bending force is a *parry fracture* of the *ulna* (the thinner of the two forearm bones). This type of fracture results when a person holds out his or her arms in self-defence, and the impact causes inward displacement of the bone. Parry fractures are often seen in accidents in which a car bumper has hit a person's shins or in deaths involving a violent struggle in which the victim has tried to defend him or herself.



3. **Shearing** - one end of a bone is held **stationary** while the other end of the bone is bent. When a shearing force is applied, a linear shearing type of fracture occurs. It is usually caused by a person attempting to stop him or herself from falling. Hence, these injuries usually occur in accidents rather than homicides or suicides. Shearing forces are also created through a blow from a large instrument or object. Shearing forces can occur when a victim is dismembered using a sharp instrument (such as a saw). Shearing force injuries usually involve damage to large surface areas of bone.
4. **Torsion** - twisting forces occurring most often in accidents. One end of a bone is held stationary while the other end is twisted in some way. These types of forces occur often in accidents such as skiing or biking and in forensic cases such as child abuse.



©ADLC

5. **Tension** - a force that pulls on the long **axis** of a bone causing it to break. Tension forces most often cause dislocation of bone, but if the force is strong enough, a portion of bone may break away. This type of bone injury characteristically involves few fracture lines and occurs most often in accidents rather than violent deaths.



©ADLC

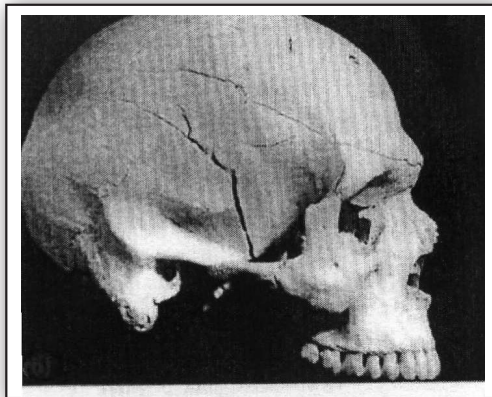
Determination of Trauma from Skeletal Remains



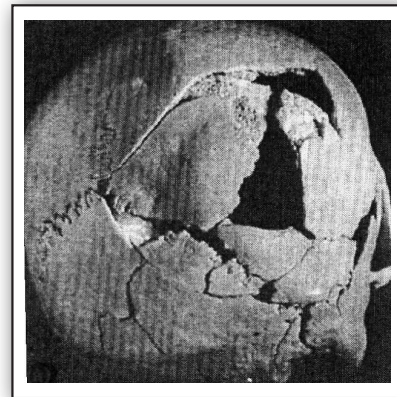
1. **Blunt Force Trauma** - an injury caused by a blow from a large instrument or object with a flat or round surface, which damages a wide surface area of the bone. The resulting injury usually involves bone compression, bending, and shearing forces over a large area. The fracture wounds tend to be simple unless excessive force is applied. Excessive force causes **comminuted** fractures during which many pulverized bone fragments are produced.

Any weapon used as a club can cause blunt force trauma (such as bat, hammer, boot, rock, or brick). Such trauma can also result from falling or being pushed onto a hard surface. Blunt force trauma typically occurs during car, train, or plane accidents.

Blunt trauma to right side of skull



Massive Blunt Trauma to back of skull



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Did You Know?



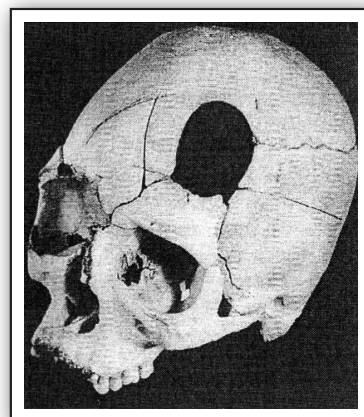
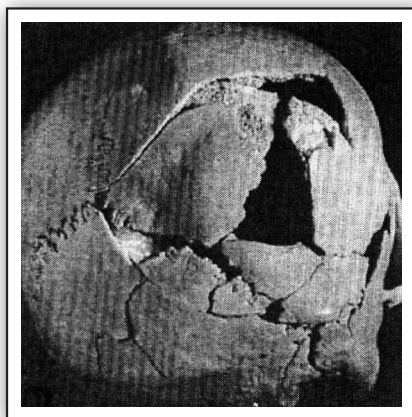
The national homicide rate in Canada increased by 4% in 2005 to its highest level in almost a decade. The increase was attributable to a rise in homicides in Ontario and Alberta.

Edmonton had the highest homicide rate among all major Canadian cities in 2005. Regina, Winnipeg, and Saskatoon reported the next highest rates.

Source: Statistics Canada website (<http://www.statcan.ca/Daily/English/060720/d060720b.htm>)



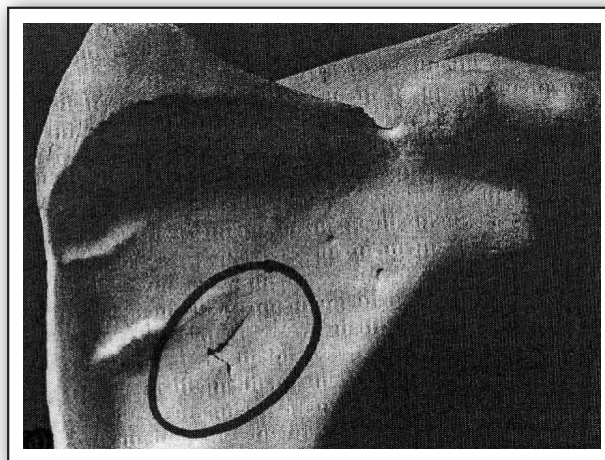
2. **Projectile Trauma** - an injury caused by a blow from a heavy moving sharp object. The types of projectiles causing this type of trauma include bullets, arrows, and spears. The injury usually appears to begin small but becomes wider as the projectile passes through the bone. These types of wounds cause the complete **displacement** of bone with radiating fracture lines from the point of impact. The type of force produced by this type of trauma is usually a compression force, but some weapons can cause a bending force.



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3. **Sharp Force Trauma** - an injury caused by a compression or shearing force applied towards a narrow focus. When the force is **perpendicular**, puncture wounds appear in the bone. If the force is applied at an angle, grazing cut marks are evident in the bone. Complete fractures of bone can occur when the weapon used is a chopping type of instrument (such as an axe). Incomplete bone **infraction** occurs when the weapon used is a cutting type of instrument (such as a knife).

Sharp Force Trauma to the Scapula, caused by a Knife



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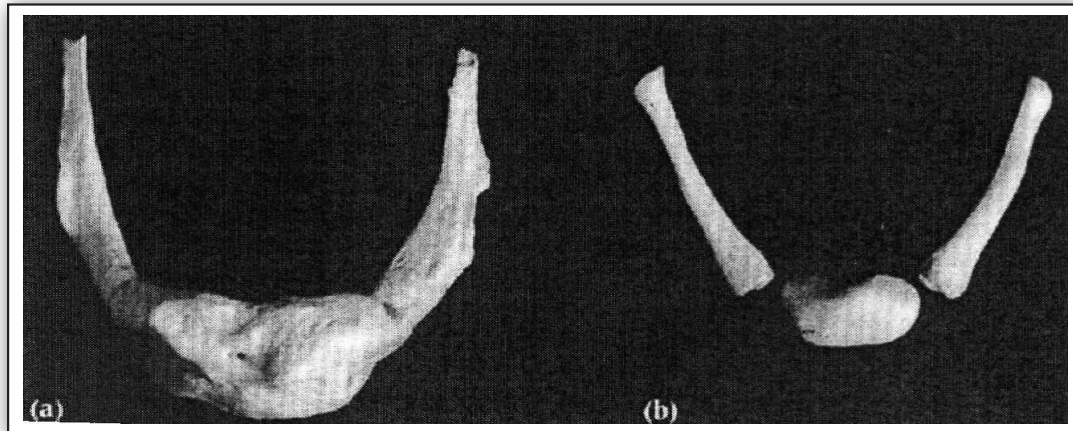


4. **Death by Strangulation** - a cause of death suspected when the **hyoid** (or hyoid bone) is damaged. The hyoid bone covers the voice box (larynx) in the neck. The hyoid bone is a free-floating C-shaped structure of three **fused** bones. In 8.0% of deaths caused by suicidal hanging, the hyoid bone appears fractured; in 34% of strangulation deaths, fractured hyoids have been observed. Thus, if a forensic anthropologist observes a fractured hyoid bone and no direct evidence suggests that death was by suicide (such as a noose around neck), the inference is made that the evidence is consistent with a death caused by strangulation.

For a forensic anthropologist to conclude from the remains of a young child that strangulation has occurred is difficult because the three bones of the hyoid have fused in only 7.0% of humans under the age of 20. (See photographs below.)

(a) Adult hyoid bone

(b) Immature hyoid bone (<20 yrs. of age)



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Did You Know?



Murder at a Sausage Factory

One of the first criminal cases in North America to use forensic anthropology occurred in Chicago, Illinois, U.S.A. in 1897. The owner of a sausage factory had killed his wife by dumping her into a large steaming vat used to make sausage. Due to the length of time the victim had been in the vat, only partial skeletal remains of her body were found in the vat. An anthropologist from Harvard University determined that the remains belonged to the sausage factory owner's wife, and this led to the first-degree murder conviction of the husband.

CRIME CASE STUDY 6.1: The Infamous Serial Killer John Wayne Gacy

Lesson 2



Forensic anthropology played a pivotal role in the investigation of one of America's most notorious serial killers – John Wayne Gacy. Forensic anthropology and other forensic methods helped to identify twenty-two of Gacy's thirty-three victims. Because only skeletal remains were available for many of Gacy's victims, forensic anthropology was used to determine exactly how they were murdered.



In 1978, a fifteen-year-old boy named Robert Piest was reported missing by his mother. She had come to pick up Robert from the pharmacy where he worked part-time. Robert had told her that he was going outside to talk to a man who had offered him another part-time job. After three hours of waiting for Robert, Mrs. Piest contacted the local police.

The man who had offered Robert the part-time job was a local contractor named John Wayne Gacy. When police went to Gacy's house to ask about the whereabouts of Robert Piest, Gacy denied having seen Robert. He told them he was unable to talk to them as there was a recent death in his family and that he had funeral details to arrange. Police asked Gacy to come to the police station later that day. Gacy was questioned several hours later, and he continued to deny having seen Robert Piest. A background check of Gacy revealed that he had a criminal record for sexually assaulting a teenager and that he was awaiting trial for another sexual assault. This led police to obtain a search warrant for Gacy's house.

In December 1978 when police initially conducted a search of Gacy's house, they discovered a strong stench in the crawl space below his house. However, the ground in the crawl space looked untouched, so the police initially assumed the smell to be of sewage. Police did find numerous suspicious items in Gacy's house including two school graduation rings, marijuana, handcuffs, two driver's licences from two unknown males, police badges, and several articles of teenage boy clothing. In the trunk of one of Gacy's vehicles, hair matching Robert Piest's was found.



Finally, after an intense investigation, police discovered that one of the graduation rings found at Gacy's house belonged to a teenager who had disappeared a year earlier. They also discovered that three of Gacy's former employees had mysteriously disappeared within the last 5 years.

All of this evidence finally led Gacy to confess to police that he did kill someone; however, he initially claimed it had been in self-defence. Gacy told police they could find the body under his garage. Police did find a body under the garage and began finding numerous remains under the crawl space of Gacy's house. Gacy then confessed to killing Robert Piest and more than thirty other young men.

The search for bodies at Gacy's house was set up much like an *archeological* dig site because the excavation had to be done carefully to preserve the decomposing remains and to keep the remains organized because some of the bodies were piled on top of each other. On the first day of the search, two bodies were found in the crawl space. As time passed, twenty-six more bodies were discovered beneath the crawl space. Some victims were buried so close together that it was hypothesized that they were probably killed or buried at the same time. Gacy told police that on several occasions he had killed more than one person in a day.

During the demolition of Gacy's property, the body of a young man was discovered preserved in the concrete of Gacy's patio. Another body was discovered under the recreation room of his house. By the end of December 1978, police removed twenty-nine bodies from Gacy's property. By the spring of 1979, police were able to connect four young male victims found in a local river to Gacy. Gacy confessed he disposed of the bodies in the river because he ran out of room in his crawl space and he had been experiencing back problems from digging the graves in the small crawl space. Fifteen-year-old, Robert Piest was one of the victims found in the local river. Like many of Gacy's victims, Robert had been sexually assaulted and suffocated after paper towels had been lodged in his throat.

Dr. Clyde Snow, a forensic anthropologist, was hired by police to help identify the victims removed from Gacy's property. Dr. Snow used missing person reports to help him identify the unknown remains. For example, he identified one set of remains found at Gacy's property as David Talsma using information from his missing persons report. In December 1977, nineteen-year-old David was reported missing. Records showed that David had fractured his left arm as a child. One set of remains from Gacy's property showed evidence of a fractured left arm that had healed. Also, the height of the remains matched David Talsma's height. The last observation that Dr. Snow used to identify these unknown remains was the fact that the left arm was several millimetres longer than the right arm and that the left *scapula* was *bevelled*. Both of these observations enabled Dr. Snow to conclude that the remains belonged to a left-handed victim. David Talsma was left-handed.

In the end, investigators used forensic anthropology techniques and dental records to identify all but nine of Gacy's victims. Gacy was found guilty and convicted of thirty-three murders in 1980. After a long legal battle that he lost, John Wayne Gacy was executed by lethal injection in 1994.



Police remove one of the 29 bodies found Friday March 17, 1979 at the Chicago suburban home of John Wayne Gacy

(AP)

Related Questions: (Note that the answers to these questions do not have to be submitted for marks.)

1. Why was forensic anthropology used in the John Wayne Gacy criminal case?
2. What specific case brought John Wayne Gacy to the attention of the police?
3. Why was the search for bodies at Gacy's house set up like an archaeological dig site?
4. In the end, how many of Gacy's victims were identified with the help of forensic anthropology?



Check your answers in the Module 6 Appendix in the back of this book.

When you are ready, please complete the assignment for Lesson 2 in the Assignment Booklet.

Lesson 3: The Use of Forensic Entomology in Criminal Investigations

Lesson Objectives: *The student will...*



- recognize that the field of forensic entomology helps investigators to determine the approximate length of time that a victim's body has been left in an area based upon insect infestation
- understand that each environment has a unique set of native insect species and that each of these insects has a unique life cycle and exhibits unique behaviours

Maggots – An Insect Commonly Examined by Forensic Entomologists



Image courtesy of the Department of Entomology, University of Nebraska-Lincoln and Jim Kalisch, UNL Entomology (entomology.unl.edu/images/blowflies/blowflies.htm)

Did You Know?



Humans have existed on the Earth for about 300 000 years; insects have existed for an astounding 250 million years! There are currently about 700 000 known insect species; however, it is thought there may be up to 10 million species that have not yet been discovered.

Source: Welcome to the World of Forensic Entomology website (<http://www.forensicentomology.com/definition.htm>)

Defining Forensic Entomology



Forensic entomology is the application of knowledge about insect **infestation** to the **decomposition** of human remains from a crime scene. Forensic entomology is a useful technique that can help to determine the time of death, whether the **corpse** was moved after death, and even the cause of death.

Insects play an important role in our environment because they help to recycle organic matter. Insects consume and decompose dead animals including other insects, dead plant matter, and organism waste (such as feces and urine).

Regardless of the environment, the weather conditions, or the landscape, insects will infest and consume any type of dead organism including humans. Thus, insects are considered **carriion** feeders, organisms that consume dead organisms. Interestingly, forensic entomologists have found that different insect species infest and **colonize** a dead body at predictable rates and in predictable sequential order. This process is known as insect **succession**.

Insect succession upon dead remains occurs in a predictable fashion because different insects thrive on different parts of the body. For example, flies prefer to feed upon fresh moist body tissue while some beetles feed only upon flesh near bone. Consequently, these beetles tend to colonize a dead body much later than flies because bone is normally exposed after several days or more of decomposition. Other beetle species consume mainly blowfly eggs, so they are not found until after blowflies have laid their eggs upon a body. These observations about insect feeding habits help forensic entomologists estimate how long human remains have been left in a particular environment.



© Thinkstock

Did You Know?



Some accident studies have shown that stings from bees or wasps are one of the top twenty causes of single vehicle collisions in North America.

Source: Welcome to the World of Forensic Entomology website
(<http://www.forensicentomology.com/definition.htm>)

Estimating Time since Death with Forensic Entomology



© photos.com



Insects can be used to determine a useful estimate of the time since death. They often appear on a corpse within minutes of death, and insect growth and succession are predictable. Consequently, determination of the age of the insects and observation of the type of insects that have colonized a body can lead to an estimate of the time since death.

As a dead body begins to decay, it starts to smell and insects are attracted to this smell. After insects arrive upon dead remains, they begin to feed, and later lay their eggs on the body. In general, insects lay their eggs shortly after they arrive to feed on a corpse. Depending on the temperature and humidity, most insect eggs hatch and the new insects feed upon the corpse within two days of the initial infestation. Therefore, the calculation of the age of these insects can lead to an estimation of the time since death.

Forensic entomologists consider other variables before they estimate the time since death of human remains. Variables that affect the rate of decomposition of a dead body include temperature, sun exposure, time of day, time of year, and whether the corpse was left in soil or water.

Did You Know?



One of the first criminal investigations that involved forensic entomology was completed by Dr. Bergeret d'Arbois in Paris, France, in 1855. The body of a baby was found behind a fireplace mantle in a house. After analyzing the insect infestation that occurred upon the dead baby's remains, Dr. d'Arbois determined that the baby had been dead for several years. Consequently, the question of guilt was then cast upon the previous occupants of the house rather than the current occupants.

Source: American Board of Forensic Entomology website
(<http://research.missouri.edu/entomology/>)

The Initial Infestation of Human Remains



When insects invade human remains, they begin to feed on blood or exposed flesh on the body surface. Regardless of the environment or climate, the most common type of insect to first infest a corpse are blowflies and/or flesh flies. Blowflies and flesh flies play the most dominant role in the decomposition of dead bodies. Usually within moments of their arrival, the female flies begin to lay their eggs in enclosed, moist areas such as open wounds or body openings such as the nose, eyes, ears, mouth, anus, penis, and vagina.

After one to two days, depending on the fly species, the eggs hatch into small *larvae*. Blowfly larvae are white, have a worm-like shape, and are commonly called maggots. Maggots grow quickly. In two to five days, they can grow from 5mm to 17mm in length. During this time of rapid growth, maggots very actively feed on dead tissue. After the maggots go through three larval stages, which take 5 to 7 days, they change into dark-coloured *pupae*.

Photograph of a Blowfly



Image courtesy of the Department of Entomology, University of Nebraska-Lincoln and Jim Kalisch, UNL Entomology (entomology.unl.edu/images/blowflies/blowflies.htm)

Pupae continue to feed on the remains by moving around the body to find more dead tissue to consume. After this active feeding period, the pupae leave the body to find a safe place to shed their outer pupal cases (*moult*) and become mature flies. This change from pupae to mature flies occurs in a predictable period and is similar to the metamorphosis of caterpillars into butterflies. After a total of approximately 20 to 26 days, the majority of flies leave the body because little flesh remains to feed upon, competition from other invading insects has increased, and the body has begun to dry due to a decrease in body fluids. Therefore, if no flies are found upon a dead body, but empty pupal cases are found, the person in question has likely been dead longer than 3 weeks. However, the exact time depends on the fly species and the temperature of the surroundings. Warmer temperatures cause faster egg and pupae maturation.

Blowfly Maggots

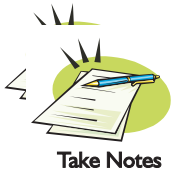


Image courtesy of the Department of Entomology, University of Nebraska-Lincoln and Leon Higley UNL Entomology (entomology.unl.edu/images/blowflies/blowflies.htm)

After blowflies and/or flesh flies have left dead remains, usually various types of beetle species are the dominant types of insects found on a corpse. Beetles tend to feed upon **mummified tissue**. Mummified tissue includes **cartilage** and other body parts that contain little or no blood or body fluids. The types of beetles that colonize a dead body depend on the geographic area in which it has been left. If the body is left undisturbed and the weather conditions are favourable, beetles will feed upon the body until only the skeleton remains.

Beetles



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Did You Know?



High dosages of the illegal drug, cocaine, have been found to accelerate the development of some blowfly species while the presence of amitriptyline, an antidepressant, can slow the development of other blowfly species.

Source: Morten Stærkeby: What is Forensic Entomology? (www.kathyreichs.com/entomology.htm)



The Effects of Weather Conditions upon Insect Infestation

Insects are **cold-blooded**. The activity of cold-blooded organisms is greatly influenced by the surrounding temperatures in which they live. Low temperatures inhibit insect activity or cause their death; warm temperatures stimulate insect activity. In general, most insects thrive in regions where temperatures are always above 0° C.



© photos.com

In Canada, insects are most active during the spring, summer, and early fall because of the milder temperatures during these seasons. Thus, it is easier for forensic entomologists to assist in forensic investigations during these milder seasons.

During Canadian winters, a forensic entomologist has difficulty predicting the time since death because insects are not active during this cold season. As well, a body dumped before the winter or during the winter is often covered by snow and not found until the snow has melted in the spring. Then, a forensic entomologist may try to determine whether the death occurred during the winter or before the winter. A death has likely occurred before the winter when dead insect eggs, larvae, pupae, or adults are found in or on the body. By analyzing these dead insects and estimating when they died using **meteorological** records, time since death can be estimated. Absence of signs of insect infestation likely indicates that the victim's body was deposited during the winter.

Did You Know?



Insects are also thought to be the cause of some aircraft crashes through the obstruction of essential instrumentation or obstruction of fuel lines causing engine failure.

Source: Welcome to the World of Forensic Entomology website (<http://www.forensicentomology.com/definition.htm>)



Determining the Cause of Death using Forensic Entomology

To find and convict a killer, it is often important to determine both when and how a victim died. The sites of blowfly or flesh fly infestation on a corpse may help to determine the cause of death or at least help in the reconstruction of events prior to death. Insect remains on a body can also be tested for foreign substances (such as drugs or toxins).

Usually, flies lay their eggs in the openings of the corpse, such as nose, eyes, ears, mouth, anus, and penis or vagina. Interestingly, forensic entomologists have found that flies tend to lay their eggs more often in the openings of the facial region than in the openings of the **anogenital** region (that is *anus* and *penis* or *vagina*). However, if a victim has been sexually assaulted prior to death and suffered from bleeding in the anogenital region during the attack, flies will likely infest these areas more than other body openings. Therefore, evidence of heavy fly colonization in the anogenital region of a body is evidence that a sex crime may have occurred.

Flies tend to lay their eggs in enclosed, moist locations such as body openings or open wounds. When heavy infestation of eggs and/or maggots are found in an area of the body where there is no apparent body opening (such as arms or legs), investigators may assume that trauma (such as a knife or bullet wound) has occurred at this site.

Not all homicide victims die from traumatic injuries. Some die of drug overdose or poisoning. Drugs and poisons can be traced in the blood, urine, stomach contents, hair, and nails of a victim's body. The hair and nails of the dead do not decompose as quickly as the blood, urine, and stomach contents; therefore, they are reliable sites for testing for these deadly substances. These drugs and poisons can also be detected in the maggots and pupae that are found on human remains. Testing maggots and pupae for drugs and poisons is especially useful if the hair and nails of a victim are not found with the remains because various body parts are deposited in different locations or because certain body parts are consumed by an animal.

Did You Know?



Police investigators got a tip that the body of a murder victim had been dumped down an open well on a small farm in rural Indiana, USA. The exact location of the farm and the well was unknown, but when investigators were searching one of several farmyards, it was obvious they had found the right location. Investigators noticed several thousand blowflies hovering over a heap of old tires. When they began removing the tires, they found a well that had been filled with tires, junk, and rocks. At the bottom of the well, they found the murder victim. Despite the fact the flies could not reach the body because of all the debris, the odour of the decomposing body had attracted them to the site.

Source: Wayne D. Lord, Federal Bureau of Investigation, Washington, DC. Case Histories of the use of Insects in Investigations.
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Using Forensic Entomology to Determine if a Body has been Moved after Death

In some forensic cases, the movement of the body may be traced using insects. If insects found upon a corpse are not *native* to the surroundings in which the body was found, it may be assumed that the individual was moved from one location to another. Insect parts or whole insects found upon evidence related to a homicide may be traced to their native locations. For example, insect parts or whole insects may be found within the interior of a suspect vehicle or in the tire treads of a suspect vehicle. These insects then could be traced by a forensic entomologist to a specific geographic location that could lead to a determination of where the suspect has been or where a victim's body may be found.

The determination of the specific types of insect species found on human remains may also help to determine if a body has been moved or if it has remained in one location. For example, some fly species prefer to lay their eggs in warm, sunny places while other flies prefer to lay their eggs in shade. Some fly species are more common in cities while other fly species are found mostly in *rural* areas.

Dr. Richard Jantz with one of his graduate students and a three day old corpse that has been placed in an air conditioned house for study at the University of Tennessee's Forensic Anthropology Center, aka The Body Farm



David Howells / Rex Features

Did You Know?



Cockroaches walking through pooled and splattered blood may produce tracks that may not be recognized by the untrained investigator. If blood contaminated cockroach tracks are found upon a ceiling, this may mislead crime scene investigators.

Source: <http://www.forensicentomology.com/definition.htm>

CASE STUDY: The Scientific Study of Insect Succession Upon Dead Remains

Pig Remains Infested by Blowflies



*Department of Entomology, University of Nebraska-Lincoln and Jim Kalisch,
UNL Entomology (entomology.unl.edu/images/blowflies/blowflies.htm)*



The information about insect colonization patterns or insect succession that forensic entomologists use to investigate homicide cases comes from data collected from scientific research studies. Because insect species and weather conditions vary from one climate to the next, research data from one geographic area (such as mixed boreal forest) cannot be applied to another geographic area (such as subtropical). Therefore, forensic entomologists use insect succession data that comes from the same geographic region as the region in which the body was found. Because homicide victims can be found in various geographic regions, numerous scientific research studies about insect succession must be completed to help forensic entomologists assist in criminal investigations. In 1996, the *Canadian Police Research Centre* (CPRC) began establishing a database that contains information about insect succession from each of the major **biogeoclimatic** zones in Canada.

One of the CPRC insect succession studies was completed in 1999 near Edmonton by Dr. Gail Anderson and Dr. Owen Beattie. The Edmonton area was chosen for this study because it is located within the mixed boreal forest zone, the biogeoclimatic zone with the highest human population in Alberta.

Instead of using human remains, pig carcasses from local farms and slaughterhouses were used to model humans. Pigs were used because their overall size and the position of their internal organs are similar to the human body. In another attempt to simulate how human remains may be found in forensic cases, some of the pig carcasses were dressed in human clothing. To prevent small animals such as coyotes from eating the dead pigs, they were covered with wire mesh.



To simulate further various conditions in which human remains may be found in a forensic investigation, the pig remains were studied in eight different types of conditions: sun, shade, spring and summer, autumn and winter, partially buried, and completely buried.

Sun vs. Shade

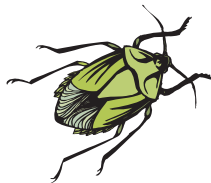
When forensic entomologists compared the decomposition of several pig carcasses left in the sun with several pig carcasses left in the shade, the following were discovered:

- The same type of fly species and beetle species invaded the dead bodies left in the sun and shade. However, decomposition by insect succession took longer in the shade.
- Masses of maggots infested the head first in the dead bodies left in both the sun and shade.
- A greater number and a greater variety of insects were found upon the pig carcasses left in the sun compared to the pig carcasses in the shade.

Spring and Summer vs. Autumn and Winter

When researchers compared the decomposition of several dead pigs during the spring and summer with several dead pigs during the autumn and winter, the following were observed:

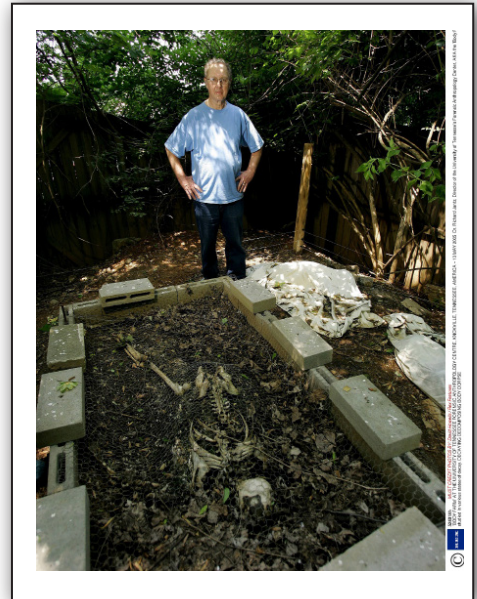
- The most abundant fly species to infest the pigs in the spring/summer was a type of blowfly known as *Protophormia terraenovae*. The most abundant species of fly to infest the pigs in the autumn/winter were 'cool weather flies' also known as *Phormia regina*.
- It took 6 days before fly eggs were laid upon the dead bodies observed in the autumn whereas flies laid their eggs upon the dead bodies within 24 hours during the spring and summer.
- In the dead bodies studied during the autumn, fly eggs did not mature into maggots likely because of an early snowfall that caused cold temperatures and high humidity. In contrast, fly eggs consistently matured into maggot masses in the dead bodies studied in the spring and summer.



Partially Buried vs. Completely Buried

Some of the pig bodies were left on the ground and partially buried under tree branches while several other pig bodies were completely buried in graves 20-30 cm deep. When scientists compared the decomposition of the partially buried pigs with the decomposition of the completely buried pigs, the following were noted:

- In the partially buried bodies, blowfly colonization followed by beetle infestation occurred in a predictable fashion. In the buried bodies, beetle infestation was predominant.
- After 15 days, decay had occurred in the face and head region of the partially buried bodies while decay was isolated to only the feet in the completely buried bodies.
- After 30 days, most of the flesh and skin on the partially buried bodies was gone and skeletal remains were visible. After 30 days, the flesh and skin was still present in the buried bodies, but they appeared *bloated*. Bone was not visible.
- Decomposition caused by insect infestation took longer in the bodies that were completely buried than in the bodies that were only partially buried.



Dr. Richard Jantz at one of the outdoor sites of the University of Tennessee's Forensic Anthropology Center, aka *The Body Farm*, where human bodies are studied in various stages of decay

(David Howells / Rex Features)



When you are ready, please complete the assignment for Lesson 3 in the Assignment Booklet.

Did You Know?



Murder is unique in that it abolishes the party it injures, so that society has to take the place of the victim and on his behalf demand atonement or grant forgiveness. It is the one crime in which society has a direct interest.

Source: W. H. Auden (1907 - 1973)

Lesson 4: Crime Case Studies Involving Forensic Anthropology and Forensic Entomology



Forensic anthropology and forensic entomology are two unique, specialized fields of forensic science that help law enforcement officials investigate the most tragic of all crimes – unknown deaths. These two fields involve the careful scientific analysis of dead human bodies. Perhaps in an attempt to make their difficult job somewhat easier, forensic anthropologists and forensic entomologists use technical terms to describe the bodies and body parts they analyze. This specialized group of scientists acknowledge and respect the evidence they handle as important because each corpse is an individual person.

This lesson focuses on three criminal case studies that involve forensic anthropology evidence and forensic entomology evidence. Two of the crime case studies are based on actual events in history:

- *The Bones That Were Worth a Thousand Words*
- *The Girl, the Army Sergeant, and The Bugs*

The third crime case study is fictional and is entitled The Farmhouse Murder.

You are expected to answer related questions about these case studies in your assignment booklet.

Lesson Objectives: *The student will...*

- analyze a historical crime case(s) or fictional crime case(s) that involves forensic anthropology and/or forensic entomology

Did You Know?



“I have gazed on the face of death innumerable times, witnessed it in all its grim manifestations. Death has no power to freeze my heart, jangle my nerves, or sway my reason. Death to me is no terror of the night but a daylit companion, a familiar condition, a process obedient to scientific laws and answerable to scientific inquiry.” - Dr. William Maples (Forensic Anthropologist)

Source: William R. Maples & Michael Browning: *Dead Men Do Tell Tales: The Strange and Fascinating Cases of a Forensic Anthropologist*. Random House, Inc. (1997)

HISTORICAL CRIME CASE STUDY 6.2: The Bones that Were Worth a Thousand Words



Example



Take Notes

Background Information

The Romanovs were the royal family that reigned in the largest country in the world, Russia, for 305 years. When the Communist party came into power in 1917, Czar Nicholas II was forced to give up his throne. He and his family were placed under house arrest in Siberia. On the night of July 17, 1918, the former Czar, his wife, their five children, and four royal attendants were executed by communist soldiers known as the Bolsheviks.

The Execution

The Romanovs and their royal attendants were taken into the basement of the house in which they were being detained. In thirty minutes, more than a dozen soldiers killed the entire group of eleven victims. To prevent identification, each body was stripped of its clothing, and the soldiers used their rifle butts to smash each face. Then the bodies were thrown into a truck and taken to a remote area. Before the victims were thrown down an abandoned mineshaft, the bodies were soaked in sulfuric acid and burned. In another attempt to prevent identification of the bodies, several grenades were detonated in the mineshaft.

Did You Know?



Legend has it that killing the daughters of the Romanov family took a long time because they concealed jewels in their undergarments, which deflected many bullets.



When rumours of the burial site spread to a nearby town, several high-ranking soldiers secretly went back, removed the bodies from the mineshaft, and loaded them into a truck. They intended to move the bodies to another undisclosed site; however, their truck broke down. Consequently, the soldiers buried most of the bodies in a concealed pit near an abandoned cart track.

Initially, the Communist government tried to cover up the murders by announcing the family had mysteriously disappeared. Eventually, the government announced that the former Czar had been executed and that his family had been sent away to another detainment site.

Discovery of the Bodies

After 74 years, the skeletal remains of the Romanovs and their royal attendants were excavated in 1991. Two of the bodies were not found in this mass burial site. It was assumed but not confirmed that these were left in the mineshaft. To confirm the identity of the nine bodies found, bone samples were sent to Britain and the United States for DNA analysis. Mitochondrial DNA analysis revealed that four females were related to Prince Phillip, a member of the British royal family and relative of Czaritsa Aleksandra, who was the granddaughter of Queen Victoria of England. Mitochondrial DNA also linked the body of one of the adult males to Czar Nicolai II's brother. Finally, nuclear DNA connected these two adults and 3 young women to each other. The remaining four skeletons were unrelated to the royal family.

Teams of Russian and American forensic anthropologists analyzing the skeletal remains were able to determine the age and sex of each skeleton. Both teams of scientists determined that nine victims likely died from multiple bullet wounds to the head and body and from multiple *bayonet* wounds to the body.

A Rifle with a Bayonet



© photos.com

Did You Know?



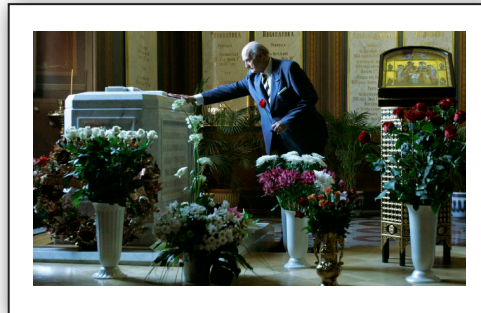
A Russian mystery writer and some geologists claimed to have located the mass burial site of the Romanovs in 1979. However, they did not come forward with the information until 1989 because they were afraid of how the Communist government would react.



Famed American forensic anthropologist, Dr. William Maples, identified each of the skeletal remains. He identified the Romanov daughters by looking at the maturation of their pelvic bones and wisdom teeth (3rd molars). Nicholas was identified by looking at his face shape, poor teeth, height, and his pelvis that was deformed because he had spent many hours on horseback. Maples was able to identify Nicholas' wife and one of the royal attendants, their personal physician, by their unique dental work. The physician had worn a dental plate and Nicholas' wife had expensive platinum crowns. The royal maid was identified by the fact she had worn joints due to her many years of hard work. The royal cook was identified because of his unique brow shape, and the royal footman was identified by his age and height. Dr. Maples determined that the two missing skeletons were those of Nicholas' only son, Alexei, and his youngest daughter, Anastasia.

Conclusion

Genetic testing by geneticists and skeletal analysis by forensic anthropologists led to the assumption that the remains were authentic. A funeral was held for the Romanovs and their attendants in 1998, and the bodies were laid to rest with State honours. Some branches of the Russian Orthodox Church even recognized the Romanovs as saints.



Dmitry Romanov, descendant of the former ruling Czar's family, at the tomb where the remains of Czar Nicholas II, Empress Alexandra, and three daughters Olga, Tatyana and Anastasia are reburied 2008. (AP/Dimitry Lovetsky)

Did You Know?



In February of 1920, a young woman, who had been rescued after jumping off a bridge in Berlin, Germany, claimed she was Anastasia Romanov. She said one of the soldiers who had killed her family had helped her escape. This mysterious young woman attracted a great deal of media attention and many supporters. She began a legal suit in a German court in 1938 to prove her identity and claim part of a Romanov inheritance. The court ruled, not that she was not Anastasia, but that she had not proved it. In 1987, she died and mitochondrial DNA testing a few years later proved that she was not a Romanov family member. Despite this evidence, many supporters still say she was Anastasia Romanov.

CRIME CASE STUDY 6.3: The Girl, the Army Sergeant, and the Bugs



Example



Take Notes

Background Information

On June 4th, 2002, the partially clad body of a young female was found beside a rural highway in northwestern United States. She was identified subsequently as a fourteen-year-old prostitute. Her brother reported her missing approximately four days prior to the discovery of her body. The main suspect was a thirty-year-old male army sergeant. Witnesses said on May 31st she had been seen alive in the company of this suspect. An accurate estimate of time of death was crucial to establishing a possible link between the suspect and the victim at the time death occurred.

Insect Evidence

An autopsy revealed that the victim had died of multiple head and neck wounds inflicted by a heavy sharp object. These were the only wounds found upon the victim's body. Numerous blowfly eggs, maggots, and adult blowflies were observed and collected from in and around the victim's wounds. Numerous photographs were taken of the crime scene, the surrounding terrain, and the corpse. These photographs included close-ups of the adult blowflies and blowfly maggots present at the time the body was discovered.

Climatological data, daily temperatures, incidence of rainfall, cloud cover, wind speed and direction, and relative humidity were obtained from a government weather station located a short distance from where the victim was found. Based on this total array of evidence, entomologists determined that the first blowflies to colonize the body had arrived on May 31st. The insect evidence indicated that the victim had been dead for four days prior to the discovery of her body.



Conclusion

Based on this evidence, the army sergeant with whom the victim had last been seen alive was arrested and charged with first-degree murder. After his arrest, he admitted to having murdered the victim by striking her six to eight times with a small hatchet on May 31st. The 30-year old suspect pleaded guilty to the murder charge, and he was sentenced to life in prison without parole.

A Small Hatchet



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CRIME CASE STUDY 6.4: The Farmhouse Murder



Example



Take Notes

Background Information

A group of teenagers accidentally found the fully clothed skeletal remains of an unknown adult in the cellar of an old, abandoned farmhouse. When police arrived at the scene, they found no identification on or near the body; however, the pink skirt and high heels found with the remains suggest that the victim was a female.

Bone Evidence

Very little flesh was found with the skeletal remains of the victim. A forensic anthropologist noted that the orbits of the eyes of the victim were round and the supraorbital ridges of the forehead were slight. Other observations of the skull included that the base of the nasal area was flared and that the canine teeth were small. The pelvis was relatively wide and flat.

Sample Pelvis from a Forensic Investigation



© photos.com

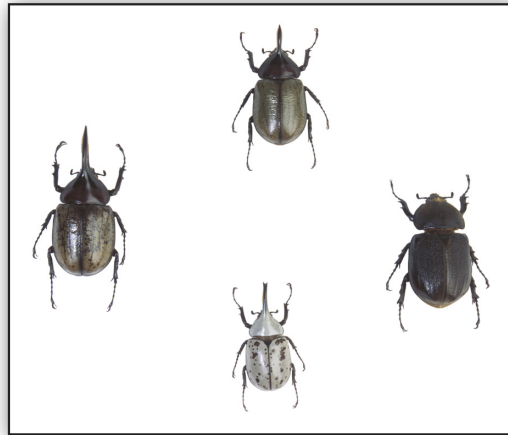


Skeletal Trauma

The hyoid bone of the victim had numerous fractures within it, and several parry fractures were observed in both of the victim's lower arm bones.

Insect Evidence

Several types of active beetle colonies were found upon the skeleton. No blowflies were present; however, numerous blowfly pupae membranes were found in the skull and in the anogenital area.



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When you are ready, please complete the assignment for Lesson 4 in the Assignment Booklet.

Forensic Studies 35

LDC 3569

Modules 5 and 6 Appendix, Bibliography, and Glossary



Module 5 Appendix

Related Questions - Crime Case Study 5.1

1. Which suspect will you ask your surveillance team to follow?

Most hotspots fall between the home and work of SUSPECT #1.

Module 6 Appendix

Related Questions - Lesson 1 Related Experiment: Anthropometric Analysis

1. What specific body regions had similar measurement averages on both male and female test subjects?

Most likely/common answer: The shoulder-longest finger and head circumference measurements tend to be similar between males and females. (Other answers are acceptable if supported by data in observation charts).

2. What specific body regions had different measurement averages on both male and female test subjects?

Most likely/common answer: The foot length, overall height, and length of hand measurements tend to vary between males and females. Typically, males are taller and have longer hands and feet. (Other answers are acceptable if supported by data in observation charts).

Related Questions - Crime Case Study 6.1: The Infamous Serial Killer John Wayne Gacy

1. Why was forensic anthropology used in the John Wayne Gacy criminal case?

Only skeletal remains were left of many of Gacy's victims; therefore, forensic anthropology was used to identify the victims and used to determine how they were murdered

The disappearance of fifteen-year-old Robert Piest was the case that brought the police investigation. Robert told his mother that Gacy wanted to talk to him about a part-time job. Gacy was the last person to speak to Robert before he disappeared

3. Why was the search for bodies at Gacy's house set up like an archaeological dig site?

The investigation was like an archaeological dig to preserve the decomposing remains and to keep the remains organized because some of the bodies were piled on top of each other

4. In the end, how many of Gacy's victims were identified with the help of forensic anthropology?

Twenty-four of Gacy's 33 victims were identified with the help of forensic anthropology

Modules 5 and 6 Bibliography

Module 5

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Module 6

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Agatha Christie quote = www.thinkquest.com

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Modules 5 and 6 Glossary

abducted: kidnapped; the taking away of a person against the person's will, usually to hold the person in false imprisonment for ransom or in furtherance of another crime

aberrant: deviating from the usual type; abnormal, straying, different

ancestry: inherited properties shared with others of one's bloodline (such as European, Asian, and African)

algorithm: an organized procedure for performing a given type of calculation or solving a given type of mathematical problem

analytical: a problem-solving approach that is detailed

anogenital: the region of the human body where the genitals (that is, penis or vagina) and the anus are located

anonymity: a condition in which an individual's identity is unknown

anthropology: the study of human beings, especially societies and cultures

anthropometry: the study of human body measurements especially on a comparative basis

anti-psychotic drugs: intended to control the symptoms of psychosis and in many cases are effective in controlling the symptoms of other disorders that may lead to psychosis

archaeological: related to the study of human cultures through the recovery, documentation, and analysis of cultural and environmental data, including architecture, artifacts, biofacts, human remains, and landscapes

autopsy: a surgical procedure after death that involves the examination of the body and its tissues; often used to determine cause of death

axis: an implied straight line in the centre

bayonet: a knife that can be fixed to the end of a rifle and used as a weapon

bevelled: any surface that is cut at an angle less than 90 degrees

biogeoclimatic: the biological organisms and climatic conditions within a given region

bloated: abnormally distended or swollen especially by fluids or gas

carrion: overcome or coerce as by use of a heavy club; severely beaten

cartilage: rubbery, fibrous, dense connective tissue – harder than ligaments, softer than bone; usually found between bones and permits smooth movement of joints

European: of, constituting, or characteristic of a race of humankind native to Europe, North Africa, and Southwest Asia and classified according to physical features; usually with lighter skin colour

cognitive: the mental process of knowing, including aspects such as awareness, perception, reasoning, and judgment

cold-blooded: organisms that do not control their body temperature but rely on the temperature of their surroundings

colonize: to establish a colony; a group of living organisms of the same type living together

comminuted: a type of fracture in which bone is splintered or fragmented

conglomerate: a corporation made of numerous companies that operate in diversified fields

corpse: a dead body; used to refer specifically to a human body in the early period after death

cost-benefit analyses: an approach whereby one seeks to identify and quantify the benefits and the costs imposed

cranial: the skull or pertaining to the skull

craniofacial: of, relating to, or involving both the cranium and the face

cultural anthropology: the observation over time of norms, customs, political, economic, and religious systems in a culture

decompose / decomposition: to rot or decay because of being broken down by microorganisms

delinquency: the commission of an illegal act by a juvenile

dismember: to cut, tear, or pull off the limbs of

displacement: a change in position; removal from the normal position or place

dubious: undecided; filled with uncertainty or doubt

empathy: showing an understanding of another's situation, feelings, and/or motives

entomology: study of insects

epiphyses: the end regions of bones that, during growth, are attached to the main bone by cartilage

erectile dysfunction: the inability of a penis to become erect or to maintain an erection until ejaculation; also called impotence

erratic: performing unpredictably

familiarity: personal knowledge or information about someone or something

femur: large upper leg bone

forensic anthropology: a specialized field of forensic science in which the goal is to analyze and interpret the human remains of unexplained deaths

fracture: a break in a bone

fused: joined together into a whole

guttered: marked with a wide, shallow groove or grooves

heinous: wicked or reprehensible; abominable

humerus: the long bone of the arm or forelimb, extending from the shoulder to the elbow

hyoid: a U-shaped bone or complex of bones situated between the base of the tongue and the larynx and that supports the tongue, the larynx, and their muscles

illegitimate: a child whose parents were not married to each other at the time of his or her birth

impulsive: acting without apparent forethought, prompting, or planning

incapacitated: disabled or deprived of strength or ability

indignation: a strong feeling of displeasure or hostility

inferred: the process of drawing a conclusion from given evidence

infestation: the development and reproduction of insects on the surface of or within a body or in the clothing

infraction: incomplete fracture of a bone without displacement of the fragments

immobilization: preventing movement to allow for natural healing to occur

larvae: the wingless and often wormlike hatchlings of insects; specific stage in the life cycle

ligamentation: pertaining to the ligaments, which are thick bands of fibrous tissue connecting bones and joints

limb: the outgrowth or extension from the body, such as an arm, leg, or wing

mass murderer: a person who kills several or numerous victims in a single incident

masturbation: excitation of one's own sexual organs by manual contact or means other than sexual intercourse

metadata: a description of the data in a source, distinct from the actual data

meteorological: the scientific study of the atmosphere that focuses on weather processes and forecasting

methodical: arranged or proceeding in regular, systematic order

methodology: a system of principles, practices, and procedures applied to a specific branch of knowledge

micro-organism: any organism that can be seen only with the aid of a microscope (such as bacteria or some insects)

modus operandi: a method of operating or functioning; a criminal's manner of committing a crime

molesting: the forcing of unwanted sexual activity by one person on another, as by the use of threats or coercion; sexual activity that is deemed improper, such as between an adult and a child

Asian: of, constituting, or characteristic of a race of humankind native to Asia and classified according to physical features

moult: the shedding of skin or other covering before entering another stage of growth

multivariate: observation and analysis of more than one statistical variable at a time

mummified tissue: tissue that contains little or no blood or body fluids because of drying or naturally as cartilage or bone

mutilated: an act or physical injury that degrades the appearance or function of the body, usually without causing death

nasal: pertaining to the nose

native: species originating naturally in a particular region

necrophilia: sexual contact with a dead body (corpse)

negated: shown to be false; proven negative

African: of, constituting, or characteristic of a race of humankind native to Africa and classified according to physical features; having dark skin pigmentation

orbits: referring to the two openings in the skull that contain the eyeballs

osteobiography: information about an individual's appearance, health, age at death, cause of death, and other characteristics derived from an analysis of skeletal remains

parry fracture: break in the proximal half of the shaft of the ulna, with dislocation of the head of the radius; called parry fracture because it is often caused by attempts to fend off blows with the forearm

pathologist: a doctor who identifies diseases by studying cells and tissues under a microscope

pelvic region or **pelvis:** the bony, basin-shaped structure formed by the hipbones and the base of the backbone

perpendicular: a straight line at right angles to another line

phallic: a representation of the penis (and often testes)

physical or biological anthropology: the identification and interpretation of human evolution and variation in humans

probability: a measure of the likelihood some event will occur

psyche: a person's state of mind

psychopath: a person with a serious mental illness or a disorder impairing capacity to function normally and safely (This person tends to be anti-social.)

psychosis: a serious mental disorder characterized by lost contact with reality (Having hallucinations or delusions psychosis is often an end-stage condition arising from various possible causes. Schizophrenia is a type of psychosis.)

pupa: (plural pupae) a life stage of some insects undergoing transformation; it follows the larval stage and precedes adulthood; the adult structures of the insect are formed while the larval structures disintegrate

radiate: diverging or spreading outwards from a central point

remorse: moral anguish arising from bitter regret for past misdeeds

retroactively: after the fact

rural: refers to an area with mostly farmland and little human population

scapula: the shoulder blade

schizophrenia: a psychotic disorder marked by severely impaired thinking, emotions, and behaviors (The person typically is unable to filter sensory stimuli and may have enhanced perceptions of sounds and colors. If untreated, a schizophrenic will withdraw gradually from interactions with others and lose the ability to take care of personal needs and grooming.)

serial murderer: a person who attacks and kills victims one by one in a series of incidents

sex: either of two major forms of individuals in many species and distinguished as female or male on the basis of their reproductive organs and structures

social scientists: scientists who study human society and individual relationships within and to society

spatial: pertaining to distribution, distance, direction, areas, and other aspects of space on the earth's surface

stationary: standing still; not capable of being moved

statistical: the mathematics of the collection, organization, and interpretation of numerical data

stature: natural height of a person in an upright position

steeped: tapered to a point at the top

succession: the gradual replacement of one type of living organism or plant by another through natural processes over time

supraorbital: located or occurring above the eye socket

surveillance: close observation of a person or group

transient: a person who stays in one location for only a short time; having no fixed address

trochanter: a bony bump on the femur (the thigh bone) to which large muscles are attached

tubercle: any small, rounded projection

ulna: one of the pair of bones of a forearm or limb; in humans, thinner and longer than the radius

vulnerable: susceptible to physical or emotional injury



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