Serial Offenders
Theory and Practice

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The Use of a Linkage Analysis as an Investigative Tool and Evidential Material in Serial Offenses

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For as long as investigators have been investigating crimes of a serial nature, whether murders, rapes, bank robberies, or burglaries, they have had to deal with the problem of deciding which cases are linked to the same offender(s). With the development of the forensic sciences, this task has become easier for the investigator. Fingerprints, DNA, fiber comparison, closed-circuit television, tool marks, ballistics, soil profiles, shoe and tire imprints, and bite marks are just some of the ways in which an offender can be linked to one or more crimes, or in which crimes can be linked to each other. A more recent method of linking crimes to one offender has been the use of a linkage analysis, which focuses not on the hard forensic sciences but instead on the behavior of the offender when committing a crime or series of crimes.
A linkage analysis, sometimes referred to as comparative case analysis (Bennell & Canter, 2002; Merry, 2000), is useful in two regards. First, during the investigation phase of a crime, it helps investigators decide which crimes to include or exclude from an investigation into the series, or how to focus their search for other similar crimes previously committed, possibly in neighboring areas. Second, the analysis can be presented as evidence in court to demonstrate that a single offender is responsible for the commission of a number of crimes when hard forensic evidence may be lacking in certain instances of those crimes.

**WHAT IS LINKAGE ANALYSIS?**

Hazelwood and Warren (2003) describe linkage analysis as a form of behavioral analysis used to determine whether a series of crimes was committed by one offender. The analysis integrates information from various aspects of the offender's crime pattern, including the modus operandi (MO), the ritual or fantasy-based behaviors exhibited, and the signature or unique combination of behaviors exhibited by the offender during the crimes. The individual(s) performing the linkage analysis engages in five assessment procedures: (1) obtaining data from multiple sources, (2) reviewing the data and identifying significant features of each crime across the series, (3) classifying the significant features as either MO and/or ritualistic, (4) comparing the combination of MO and ritual/fantasy-based features across the series to determine if a signature exists, and (5) compiling a written report highlighting the findings.

However, Hazelwood and Warren (2003) do not include another valuable aspect of an offender's behavior that can be useful in its own right for linking cases, that of geographic behavior. Various authors (e.g., Canter, 2003, 2004b; Rossmo, 1995, 1997, 2006) have written about the geographic behavior of serial criminals, albeit serial murderers, serial rapists, or serial house burglars. Besides the implications for determining the offender's anchor point, such as a place of residence or employment, the close proximity of crime scenes to each other can also be used as a linkage factor (see Keppel, 1995). It is the author's experience that many of the assumptions about geographic patterns of behavior hold true in the South African context. This sentiment is shared by Hodgskiss (2004) in his research into South African serial murder. It is also not clear from Hazelwood and Warren (2003) the part that victimology plays in a linkage analysis.

Keppel (1995, 2000a; Keppel & Birnes, 2009; Keppel & Weis, 2004) refers to a signature analysis. Signature is seen by Keppel as the offender's unique personal expression on the crime scene, the actions that go beyond what is necessary to commit a crime (Douglas & Munn, 1992b; Geberth, 2003; Keppel, 1995). Keppel (2000b) further de-
scribes the signature as the offender's personal expression, or an imprint that he or she feels psychologically compelled to leave at a crime scene. Examples he lists are mutilation, overkill, carving on the body, leaving messages, positioning the body, postmortem activity, or forcing the victim to respond verbally in a specific fashion (Keppel, 2000b). Keppel regards MO as the behaviors that allow the offender to commit the crime successfully and escape detection. Hazelwood and Warren (2003) seem to echo the sentiment on MO, but see signature as being made up of MO behaviors (if the combination is unique enough) and/or the ritual/fantasy behavior. Perhaps a shortcoming of a signature analysis as proposed by Keppel, as opposed to a linkage analysis (proposed by Hazelwood and Warren, 2003) that encompasses signature commentary, is that a signature analysis requires behaviors "over and above" what is necessary to commit the crime. The implication is that it does not assess common MO behavior for linkage purposes (Keppel, 1995) that are perhaps unique in combination with each other.

Irrespective of which approach is used, case linkage rests upon two main assumptions: (1) the assumption that an offender will display some consistency in his or her behavior across a series of offenses and (2) the assumption that there is sufficient variation between offenders, allowing them to be distinguished from each other (Bateman & Salfati, 2007; Woodhams & Grant, 2006). Grubin, Kelly, and Brundson (2001) state that for any case comparison procedure to be successful, techniques are required that will reliably recognize when similarities between cases are more than coincidental. Establishing similarities necessitates:

- The identification of relevant offenses features
- A valid procedure to compare offenses based on these features to determine the degree of similarity between them
- A means to calculate the likelihood that any similarity is more than a mere random event

Once similarities have been identified, it is essential to determine if they are due to coincidence or other factors. For example, murder victims being found on their backs is most likely not a unique-enough finding to use as a linkage factor. Grubin et al. (2001) go on to state that once a linkage analysis has been done based on similarities, further methods can be used to improve specificity. They advocate using temporal and geographic information to improve accuracy. For example, if two similar offenses have been committed at almost the same time but hundreds of miles apart, then it is not likely that the same offender was involved, regardless of how similar the crimes.

It is essential to have enough knowledge of the crime being assessed to determine if the behavior, or combination of behaviors, is unique enough for it to have relevance for linkage purposes. Linking of cases is therefore not a generic skill that can be ap-
plied to any crime that the analyst is faced with. Expert knowledge of the crime is regarded as a prerequisite. This is especially relevant if the linkage analysis is to be presented in court as evidence.

**WHY USE LINKAGE ANALYSIS?**

A linkage analysis can have various uses depending upon the stage of the criminal justice system in which it is used. In initial phases, it can be used as a stand-alone report aimed at helping investigators sift through cases to determine if a series exists and which past and new cases should be assigned to a task team to investigate the series. While this could be a stand-alone report, it is often, in South Africa, the first section of a broader offender profile (Labuschagne, 2003). Secondly, it can be used at the trial phase during the presentation of the prosecution's case to suggest that certain crimes are the work of one individual. This application may help link the accused to other cases for which he or she is on trial if some of the cases lack eyewitness and forensic evidence, despite the strikingly similar and unique manners in which the crimes were committed. In South African courts, the presiding officer at a trial can decide for himself or herself, without expert evidence being presented, that certain crimes are unique and similar enough in nature and circumstance that the reasonable, logical conclusion is that one offender was responsible. A linkage analysis is aimed at assisting the presiding officer to come to such a conclusion.

The linking of cases allows law enforcement agencies to act more proactively in the investigation and identification of serial crimes, thus allowing limited resources to be more effectively allocated. As Woodhams, Hollin, and Bull (2007) state, the linking of a series is useful in three ways. First, linking increases the amount of evidence against the offender. Each case might have limited evidentially relevant information that, in isolation, might have little impact on the investigation; however, when put together, like a jigsaw puzzle, these findings could amount to vital information that can help identify and convict an offender.

Second, if crimes are suspected to have been committed by one offender, they can be investigated together, rather than separately, allowing police resources to be allocated more efficiently. For example, suppose there are five offenses committed by one offender, and each case is being investigated by a different investigator. Once the offender is arrested, each investigator has to charge the offender on his or her case, which means five court appearances and court dates running independently. This takes up the time of five, instead of one, investigator.
Third, after arrest, a linkage analysis can be used as similar fact evidence (discussed later in this chapter) to help convict a serial offender. Some cases in a series may lack physical evidence (e.g., DNA or fingerprints) or eyewitness evidence to link the suspect to the specific crime(s); however, due to an overwhelming similarity of all of the offenses, the only logical conclusion that can be drawn by the court is that the same offender was responsible for all of the offenses. It is most logical that such evidence be presented at the end of the prosecution’s case, once all of the facts are before the court. The linkage analysis forms a sort of “web” over the existing evidence that has been presented, which may (depending on each case) include DNA, fingerprints, and other traditional linking factors in a trial. It must be remembered that the linkage analysis itself should not mention other nonbehavioral evidence.

The use of a linkage analysis during an investigation should be seen as an ongoing and not static process. Invariably, investigators will not have all the information about a case at the early stages after a crime has been reported. For example, in a sexual murder scenario, investigators may wait weeks if not months for DNA results, autopsy reports, and other forensic results such as toxicology. In the South African situation, this leaves investigators to make linkage decisions based on less information than is ideal. Investigators tend to “cast the net” wider than might be expected in search for other old, current, or future cases that could be related. Cases are often tentatively included, the current case file contents are reviewed for further details that might indicate a linkage, and ultimately some cases may be excluded when further information becomes available, or confirmed if results such as DNA become available and confirm that the same offender’s DNA is present.

It must be remembered that not every action taken by investigators will lead to positive results. Certain lines of inquiry may be investigated that turn out to be dead ends. It is often creativity or initiative that leads to investigative success, and academic researchers should be wary of creating a situation in which investigators believe that no investigative decisions can be made unless extensive research exists to back up the decision. Therefore the context in which the linkage analysis is being used is very relevant.

Nonetheless, when a linkage analysis is used as evidence in court, it must be able to stand up to the requirements for admissibility. Linkage reports have been presented as similar fact evidence in courts in South Africa, including State v. Sukude, 2006, the Newcastle Serial Murderer; State v. van Rooyen, 2007, the Knysna Serial Murderer; and State v. Nyauza, 2007, the Quarry Serial Murderer. In all of these South African cases, the linkage analysis evidence was accepted and the accused was found guilty of all of the murders for which he was charged. In one case (State v. Stander, 2008, the Port Elizabeth Prostitute Serial Murderer), the linkage analysis was provided to the
defense before the author’s testimony, which, nearing the end of the trial, in part led to the accused deciding to make formal admissions to the court that he had indeed murdered the two victims for which he was charged, with the provision that the linkage analysis then not to be presented to the court as evidence.

Keppel (2000a) refers to at least five instances in the United States in which a signature analysis was admitted in murder trials, and their appeals, as evidence that certain cases were linked. Keppel and Birnes (2009) also refer to a case in Canada (Regina v. Burlingham, 1986) in which case linkage evidence in the form of similar fact evidence was used as evidence in a double murder trial. He further states that signature analysis is “the only crime scene assessment technique that is accepted in court testimony and appellate decisions” (Keppel, Weis, Brown, & Welch, 2005, p. 14). Keppel and Birnes (2009) list the following cases in which evidence was presented regarding the similarities of cases:

- **California v. Bogard**, 1996. Evidence was offered that the same person was responsible for a series of six rapes.
- **New Jersey v. Fortini**, 2000. Evidence was presented regarding the similarities across a series of offenses.
- **South Dakota v. Anderson**, 1998. A review of the signature aspects of two murders was offered at a hearing to determine if they would be joined for prosecution.

They also list a number of murder cases where linkage testimony was admitted at trial and upheld under appellate scrutiny in the United States:

- **Louisiana v. Code**, 1994
- **Delaware v. Pennel**, 1989
- **California v. Prince**, 1992

The legal principles and expert evidence used in some of these cases will be discussed in the following sections.

**WHAT DOES THE RESEARCH SAY? IS LINKING POSSIBLE?**

So far, activities or techniques that fall within the realm of behavioral analysis, such as offender profiling, have often lacked a solid research-based foundation to support the assumptions underlying these techniques. Linkage analysis, however, seems to have a slowly growing body of empirical support for its claims. One field that has proven
to be an asset in studying this process is that of personality psychology (Woodhams, Hollin, & Bull, 2007). For many years, this field of psychology has been studying the consistency of people's behavior in nonforensic settings. Researchers in this field have discovered that people have stable but distinctive ways of reacting to situations, so-called "if-then" contingencies (Mischel, 1999). This field acknowledges that while people are consistent because of their personality traits, situational aspects also have an impact on people's behavior and, therefore, consistency.

Much of the focus in linkage analysis is on similarities across different cases in a series. This approach is based on the assumption from personality psychology that offenders are consistent in the way they behave across their criminal activities and that the behavior of one offender can be distinguished from the behavior of another. While similarities are undoubtedly important in this process and can perhaps be regarded as the "bread and butter" of linkage analysis, the author has experienced that changes in offender behavior across offenses can also be vital linkage factors. This finding is echoed by Keppel and Birnes (2009), who regard behaviors such as "increasing number of death-producing wounds from the first case to the last case" and "decreasing number of defensive wounds from the first case to the last case" (p. 11). Grubin et al. (2001) similarly found that evolution across a series occurs and that such evolution can provide valuable information about whether an offender is in the early, middle, or advanced stages of a series, an insight that could be factored into a linking algorithm. This finding was also noted by De Wet (2008) regarding the sexual behavior of South African serial rapists. Similarly, Wentink (2001), who analyzed the first three offenses of a sample of North American serial murderers, discovered that there was an evolution in the form of thematic differentiation; in other words, the offense behaviors became more thematically specific. Hodskiss (2001), who studied the offenses of 13 South African serial murderers, found that offense behaviors evolve as the series progresses, with an MO developing and becoming more thematically distinct.

This evolution in behavior is often due to the progression of an offender's behavior across a series of offenses as more of the fantasy gets enacted upon subsequent victims, or as the offender becomes more effective in committing the crimes due to experience and confidence. It is incorrect to describe these findings purely as changes in behavior, but rather as the acting out of more of the offender's original intention as the offender "settles in" to his or her crime with each subsequent offense. Also, it is important to note that changes do not occur in all aspects; for example, victimology may remain the same, but specific behaviors may become embellished. These "changes" can be important linkage factors. They can indicate "trial runs," as illustrated by the following example that occurred in South Africa.
An offender, who eventually murdered an interior decorator in his home by means of multiple axe and hammer blows to the head and kept her body in his bathtub for a few days before finally leaving her nearly naked body along a busy highway, first engaged in trial runs. His first potential victims, to whom he inflicted no injury, were estate agents. Using a false name and a different cell phone number, he would make appointments with them at houses they were selling. He would meet with them, pretend to be interested in buying an expensive house, enjoy the treatment he received from them, then leave without harming them or giving them any indication that they were in danger. Just prior to the murder of the interior decorator, he met with his first interior decorator, who came to his house to give him a quote for work he wanted done to his house. She cut her consultation short after seeing a hammer in the bathroom, which made her feel uncomfortable. This was the same bathroom where the murder victim was finally attacked and murdered.

On the surface, there are many “changes” in the offender’s behavior. For example, he initially met estate agents at houses they were selling but later focused on interior decorators who would come to his house. He did not hurt the first few people he contacted; only the final victim, the second interior decorator who came to his home, was attacked and murdered.

As Grubin et al. (2001) state, if behavior is to provide a means for linking offenses committed by one offender, it must be assumed that at least some behaviors remain consistent across the series of offenses, or evolve in a predictable way. This raises the question, how similar must the behaviors be? And on what level must there be similarity? “Micro” or “macro”? The offender in the preceding example changed in certain aspects on a superficial, microlevel (e.g., from real estate agents to interior decorators) and remained the same in other ways (e.g., female victims). However, he remained the same on a thematic, macrolevel, using a con story to lure female victims in occupations that required them to meet with potential clients in isolated circumstances. Also, he only harmed one victim, the final victim.

In another example from South Africa, during a series of five murders, in two cases the offender made a small fire on the vagina of the victim. In another two cases, the offender inserted objects into the victim’s vagina; the first insertion was a small bag of marijuana, and the second insertion was the investigating officer’s business card, rolled up and tied with a piece of the victim’s hair. For the fifth victim, what the offender did to the vagina differed (i.e., did not involve fire or insertion), but the theme remained constant—tampering with the victim’s genitals—and this was the offender’s signature. Also, in that particular series, the victims were from three different racial groups, but were all prostitutes, which was also part of the offender’s signature. Keppel and Birnes
(2009) note that in their experience the serial prostitute murderers tend to be racially indiscriminate in their victim selection.

Keppel and Birnes (2009) also refer to the case of William Heirens in 1945 who murdered two adult women and a 6-year-old child, and committed 26 additional crimes including burglaries, assaults, and robberies. In the case of one of the adult victims, he wrote on a mirror in the victim's home, “For heaven's sake, catch me before I kill more; I cannot control myself,” and in the home of the 6-year-old girl, he left a “ransom” note (p. 22). Regarding the written notes, Keppel and Birnes state, “The messages he scrawled were the visual representations of his attempt to manipulate others, even though the wording was different in each note. It was not the actual wording of the notes or the writing medium, but his compulsion to leave notes that was the signature” (p. 23).

Bateman and Salfati (2007) refer to two different approaches—consistency in individual behaviors and consistency in themes of behaviors. Consistency in individual behaviors looks for more unique, signature types of behaviors. Their critique of this approach is that much of the literature on signatures is not supported by empirical studies. However, other studies, focusing on aspects such as geographic linking have found consistent behavior in this regard (Lundrigan & Canter, 2001; Tonkin, Grant, & Bond, 2008). Others (Grubin et al., 2001) examined consistency in serial sexual offenses and statistically developed four offense domains of behaviors relating to control methods employed by the offender, sexual aspects of the offenses, escape mechanisms used by the offender to avoid detection, and the offender's offense style. Grubin et al. (2001) found that the control and escape domains proved to be more useful for linking purposes due to their consistency. Criticism of the individual behaviors approach highlights reasons such as the situationally dependent nature of such behaviors (Bennel & Canter, 2002), the victim–offender interaction in contact crimes (Salfati & Bateman, 2005), and the offender’s ability to learn from previous experience (Grubin et al., 2001).

The other approach is the consistency of themes. In this approach, investigators examine “pools,” or groups, of offender behaviors that all encompass the same psychological meaning, instead of individual behaviors displayed throughout the commission of a crime (Bateman & Salfati, 2007). This approach partially negates the impact of the criticisms leveled against the individual behaviors approach. Bateman and Salfati’s (2007) research states that there is no evidence to suggest that it is better to use one approach above the other when linking murders.

Woodhams and Grant (2006) examined the use of a categorization system for rapists' speech as a means for linking rapes. They discovered that the system demon-
strated a satisfactory inter-rater reliability and could classify the majority (91%) of the rapists' utterances in the sample, with positive implications for linkage. Other earlier researchers also focused on speech profiles of offenders (Canter, Heritage, & King-Johannessen, 1989; Dale, Davies, & Wei, 1997).

Other studies that indicate a measure of success for the field of linkage analysis include those by Bennell and Canter (2002) and Green, Booth, and Biderman (1976). Tonkin et al. (2008) found that in serial car theft spatial behavior, specifically the distance between theft locations and dump locations, is consistent and distinctive. Woodhams, Grant, and Price (2007) found support that linked offenses were significantly more similar than unlinked offenses. Woodhams et al. (2007) found support for two of the assumptions underlying the practice of linking crimes, those of behavioral consistency and inter-individual variation. Woodhams and Toye (2007) found support for the hypotheses of offender behavioral consistency and offender behavioral distinctiveness.

De Wet (2008) analyzed the MO of nine South African serial rapists who had a total of 75 victims. This research revealed that offenders were consistent in their method of approaching their victim. For example, five offenders always used a con story when approaching their victims, and another two offenders used a con story almost every time (94% and 89% of incidents). One offender used a surprise approach in 75% of his attacks, while only one offender varied his methods of approach. Regarding crime location, five of the nine offenders raped all their victims (in total 48) outside. Three of the others were consistent in rape location (90%, 86%, and 75% of incidents). Five offenders were consistent in only attacking victims during the day, no offenders took precautions to hide their identity from the victims, and only one used a condom (once) during his series.

Other literature dealing with linkage analysis is provided by Hazelwood and Warren (2003), who describe the processes involved in linkage analysis; however, their findings are based on investigative experience, not on a formal study. Similarly, the publications of Keppel (1995, 2000a), Keppel and Weis (2004), and Keppel and Birnes (2009) are based on experience, while Labuschagne (2006) describes the process of linkage analysis and its use as similar fact evidence in the conviction of a serial murderer in the form of a case study.

**INFORMATION REQUIRED TO COMPILE A LINKAGE ANALYSIS**

Keppel (1995) lists the following as sources of information when compiling a signature analysis: police reports from the initial investigation of the crime scene, victim background, crime scene diagrams, evidence reports, laboratory reports, autopsy reports,
and photographs. Hazelwood and Warren (2003) refer to the gathering of "detailed, varied, multi source documentation" (p. 587) and state that for a series of rapes this documentation would be victim statements, police and medical reports, and, if possible, a commercial map depicting all the significant locations featured in the process of the crime. For murder cases, they state that the following should be included: police, autopsy, and toxicology reports; crime scene and autopsy photographs; and, if appropriate, a commercial map depicting all the significant locations featured in the process of the crime.

Another tool that can be used when doing a linkage assessment is electronic databases such as the Homicide Investigation Tracking System (HITS) in use in Washington State and Oregon, which also contains murder cases from other states and Canadian provinces (Keppel & Birnes, 2009); the Violent Criminal Apprehension Program (VICAP); and the Violent Crime Linkage Analysis System (ViCLAS) used in Canada and in certain European countries. When certain unique features are noted at a crime scene, investigators can search these databases for cases with similar features for linkage purposes, or, when at trial, to indicate how rare those features are, thus supporting the evidence that the cases were most likely committed by one offender. This process is in essence similar to investigators comparing crime scene fingerprints or DNA to similar databases for a "hit" and then stating statistically in court what the likelihood is of someone other than the offender having the same fingerprint or DNA. Granted, linkage analysis is far from having the same statistical reliability of fingerprinting or DNA. As Grubin et al. (2001) state:

Unlike the matching of DNA samples where comparison parameters are well established, we have only a limited understanding of which variables to compare, and of what counts as a good match between them, when searching for relevant offence behaviors. Just as important, we do not have population base rates that will allow estimates of how frequently specific behaviors, or combinations of behaviors, occur. In the absence of such base rates it is not possible to estimate the likelihood that a particular behavioral pattern relates to a single source. (p. 4)

However, if such databases are available and can be made use of either in the investigation phase or trial phase, then they should be. In the absence of these applications, the databases are still of great value if used to request murder cases in the surrounding area for a set time frame before and after the murder, and to compare the characteristics of those cases to the cases under review. This is an activity often done by the author in intimate partner murders where the crimes have been staged as a house robbery. The author reviews house robbery cases before and after the incident in question, com-
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pares those features to the case under review, and comments on the similarity or difference thereof.

FACTORS THAT CAN INFLUENCE A SIGNATURE OR LINKAGE ANALYSIS

Hazelwood and Warren (2003) highlight factors that can influence crime scene behavior and, therefore, what the analyst will see when making an analysis. They refer to six observations:

1. A crime scene analyst will often identify more MO behaviors than ritual behaviors.
2. All aspects of the ritual may not be present in every crime, depending on the time available, mood of the offender, and external circumstances beyond the control of the offender.
3. Some ritual aspects may not be recognized as such and may be attributed to MO; they may only be determined as ritual upon interviewing the offender after apprehension.
4. Some elements may function as both MO and ritual. Tying up a victim, for example, may allow the offender to commit the crime and flee the scene, but the offender may also be sexually aroused by bondage.
5. Ritualistic behaviors may remain known only to the offender.
6. An impulsive offender may be devoid of ritualistic behaviors or even a clear MO.

In South Africa, due to high temperatures, bodies decompose quickly, and animal predatory activity is common in bodies not quickly discovered. It is the author's experience that most murder series occur outside, thus increasing the problems regarding a speedy discovery of the body and the activity of predators. Keppel (1995) echoes this sentiment regarding decomposition and also comments that crime scene contamination will also affect the linkage analysis. One example of crime scene contamination is when members of the public or even police officials cover up the face or whole body of a sexual murder victim. If it is not made known to either the profiler or the person compiling the linkage or signature analysis that the body was covered by someone other than the offender, then faulty interpretations can be made regarding the relevance of the covering.

Certain types of crimes can also compound the difficulties associated with signature or linkage analysis. One example would be a muti (medicine) murder, common to South
Factors that Can Influence a Signature or Linkage Analysis

Africa (Labuschagne, 2004). As discussed in Chapter 8, in this situation, a person is instructed by a traditional healer to obtain a particular human body part, which is then to be used as an ingredient in the concoction of a “potion” used to allow the user to achieve a particular aim. The mutilation is enacted upon the instruction of the traditional healer and is not due to the inner psychology of the person committing the murder.

In crimes such as rape or other sexual offenses, the absence of a behavior could be a positive linkage factor (Woodhams et al., 2007); however, the absence of a behavior in a victim's statement might be due to memory lapse. The behavior may not have seemed significant to mention or the interviewer may have failed to ask questions to elicit the information or may have failed to record the information.

It must also be taken into account that interpersonal crimes are an interaction between an offender and a victim. Depending on how the victim reacts, passively or aggressively, the offender might not be able to exhibit or act out all of his or her desired behaviors. Other situational factors, such as the presence of passersby or witnesses, might cause the offender to the prematurely terminate the crime. Such factors may complicate linkage in that a crime that started out with the intent of being a rape-murder might only end up being a rape or an assault with intent to do grievous bodily harm. As a result of this alternative crime classification, investigators searching for similar murder cases might overlook an assault case that could be the work of the same offender. Similarly, an intended rape might end up being only an assault case if for various reasons the offender did not go through with the crime.

Unreported crimes can leave “gaps” in the offender’s behavior. For example, in a rape series, a victim may not come forward to the police to open a case. These gaps might lead cases to appear very different; yet, if all cases were reported, then a logical progression in behavior could be clearly seen.

Finally, certain information may not be available at the time of the linkage analysis, or might not be made known to the person compiling the linkage analysis, either intentionally or unintentionally.

Similar to this discussion is the concept of “linkage blindness,” a term coined by Steven Egger (1984). He says linkage blindness occurs when law enforcement agencies are prevented from seeing, or make little attempt to see, beyond their jurisdictional areas of responsibility. He states that this concept is applicable to all types of “mobile” crimes, including serial murders (Egger, 2002). As a result of linkage blindness, similar crime patterns or MOs are not noted across geographic areas of responsibility. This problem is heightened when these areas are managed by different law enforcement agencies, but it is also seen in a single law enforcement agency that is very large, such as the South African Police Service, which is a national law enforcement agency that is
divided up into different management areas within a province, and between provinces. As a result, certain cases that fall into the jurisdictions of different police stations might not all be identified as being the work of one individual.

Grubin et al. (2001) highlight certain practical difficulties in developing a linkage system. These include consistent but extremely common behaviors, consistent but extremely uncommon or idiosyncratic behaviors, variations in consistency, precision of the description, victim response, the weighting of behaviors, evolution of behaviors, and the interpretation of behaviors.

LEGAL PRINCIPLES UNDER WHICH LINKAGE EVIDENCE IS ADMISSIBLE —

Ormerod (1999) comments on the use of “psychological profiling” as evidence in court, and some of the concerns expressed in that regard are relevant to the use of linkage analysis in court. He refers to the use of a psychological profile as an aid for the prosecutor to conduct a more effective cross-examination of the accused, in which event, it is not playing an evidential role but rather a strategic role. He further states that a psychological profile may, albeit problematically, be used to highlight to the court how the accused fits the profile compiled during the investigation. The difficulties of its use in a trial would be to overcome two laws of evidence: relevance and admissibility. However, while psychological or offender profiles may have difficulty standing up to cross-examination in court because of a lack of supporting research and their non-specificity, it must be remembered that they are created primarily as an investigative tool (Gudjonsson & Haward, 1999; Labuschagne, 2003), not as evidential material. This is similar perhaps to the use of a polygraph or Layered Voice Analysis during an investigation to aid investigators in deciding on which possible suspects to focus, but the results of which will not be introduced as evidence in trial proceedings.

The United States (on both the state and the federal levels) and countries throughout the world have their own legal systems with their own rules for the admissibility of evidence and requirements for expert or opinion evidence. In the United States, some states use the Daubert (1993) standard, others the Frye (1923), and others the Kumho (1999). There are also the Federal Rules of Evidence for federal cases. Under the Daubert standard, unless the testimony rests on a reliable foundation and is based on scientifically valid principles, the judge may deem such testimony inadmissible. Under the Frye standard, unless the testimony offered reflects either a principle or discovery that has gained general acceptance in a particular field, it should be excluded by the judge. The Frye test is usually reserved for testimony involving new methods or new scientific principles from which conclusions are drawn. This was the test in the cases
Delaware v. Pennel and Washington v. Russel mentioned previously. Under the Kumho standard, "expertise that is false and science that is junky" may be excluded by the judge as part of his or her gatekeeping function; thus, it is up to the judge to decide if it is true science or not.

The Federal Rules of Evidence, specifically rule number 702, states:

*If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.*

These different requirements would undoubtedly affect whether certain techniques, such as a linkage analysis, would be admissible. It is therefore essential to determine what those requirements would be before applying any technique, or appearing as an expert, in a court of law.

An expert witness has primarily one role in the court: to provide the court with expertise not typically within the knowledge framework of the court or jury. If accepted, the court adopts the expert's opinion as its own, as the court may not delegate its responsibilities to another—e.g., the expert witness (van der Berg & van der Merwe, 2002). For this expert testimony to happen, a person must be qualified as an expert by the court because, as a general rule, opinion evidence is not admissible except when the witness is in a better position than the presiding officer or jury to form an opinion. The opinion of an expert is admissible if it has evidential value and relevance. A person is qualified as an expert by the presiding officer based on knowledge and experience, and ultimately the presiding officer decides whether to accept or reject the expert evidence, or in a jury system, to allow it to be used as evidence during the trial. It is imperative in the linkage analysis situation that the witness be not only an expert in the process of compiling linkage analyses and the supporting literature, but also an expert in the type of crime under investigation (e.g., serial murder or serial rape).

The other principle involved regarding the use of a linkage analysis in court is that of "similar fact" evidence, sometimes referred to as "other crimes" evidence. Other crimes evidence was used in the cases Louisiana v. Code, New Jersey v. Fortini, and Washington v. Russel mentioned earlier, and similar fact evidence was used in R v. B (a sexual assault trial) and R v. Burlingham (two murder cases) in Canada. Generally, the courts will not admit similar fact evidence because the evidence is irrelevant to the facts at hand. An
example of this is the use of previous convictions to try to convince the court that an accused is guilty of the current similar charges, due to his or her character. It is regarded as irrelevant, as it cannot prove or disprove the facts at hand for the current trial.

The exception to the rule is if the evidence can contribute to the facts in issue. There must be a logical connection or nexus between the similar facts and the facts in issue. The greater the correspondence and the closer the evidence and facts in issue are in time, place, manner, and nature, the easier it is to conclude that the required nexus exists (Schwikkard, 2002). The relevance of the similar fact evidence will also be determined by the strength of the other evidence available (Hoffmann & Zeffertt, 1988). Similar fact evidence is often used when an accused is charged with numerous crimes that are of a similar nature and unique in their MO (Petherick, Field, Lowe, & Fry, 2005), such as serial murder or serial rape where there is strong evidence of guilt, as evidenced by DNA or identity parade, in some but not necessarily all of the instances. Based on other similarities, the court may conclude that the suspect was responsible for the other charges also, even without there having been expert evidence regarding linkage during the trial. For other crimes evidence, findings that the accused had committed a similar, unique, crime in the past can be introduced as evidence. In Louisiana v. Code (1994), the court stated the following:

Several factors must be met for evidence to be considered as evidence of modus operandi: (1) there must be clear and convincing evidence of the commission of the other crimes and the defendant’s connection therewith; (2) the modus operandi employed by the defendant in both the charged and the uncharged offenses must be so peculiarly distinctive that one must logically say they are the work of the same person; (3) the other crimes evidence must be substantially relevant for some other purpose than to show a probability that the defendant committed the crime on trial because he is a man of criminal character; (4) the other crimes evidence must tend to prove a material fact genuinely at issue; (5) the probative value of the extraneous crimes evidence must outweigh its prejudicial effect. (p. 11)

Invariably, for someone to be indicted on a crime(s), he or she must have been linked to the crimes in some or other manner, such as by DNA, fingerprints, or any of the other traditional means by which an offender is identified. Without such evidence, a prosecutor would most likely have declined to prosecute in the first place. A linkage analysis is typically presented at the end of the state’s case (in adversarial systems), once all the evidence is before the court. In that sense, the linkage analysis presents the final, overarching piece of evidence, or the final “layer” of evidence. Ideally, the trial would proceed in the order that the offenses occurred, allowing the court to follow in
Case Example: The Newcastle Serial Murders

The footsteps of the offender’s series. To present linkage analysis too early might result in much of the information being regarded as hearsay, as the witness would be testifying about facts that have not yet been presented to the court and were not personally experienced by the witness.

CASE EXAMPLE: THE NEWCASTLE SERIAL MURDERS

The First Incident

At 6 pm on Saturday, February 14, 2004, a young black couple walked to a park bordering the town of Newcastle in the KwaZulu-Natal province of South Africa. After drinking a few beers, they decided to engage in sexual intercourse. While they were engaged in intercourse, the offender crept up to them and struck the male on the head with a large rock and killed him. He pushed the male victim off the female victim and slapped the female with an open hand while she tried to keep him at bay. The offender then hit the male victim with the rock a second time before dragging the female victim away. When the female victim screamed, the offender displayed a knife, threatened to stab her, and dragged her to a nearby ditch approximately 10 meters from where the initial attack occurred, where he raped her once. After the rape, he told her to dress and leave.

The male died at the scene at the same location where he was struck. The cause of death was determined to be blunt force trauma to the head. There were no other wounds inflicted on the murder victim. The bloodied rock was found at the scene, approximately 1 meter from the head of the deceased, who was lying on his back. He was clothed, but his pants were unzipped and his belt undone. Nothing was stolen from either victim.

The Second Incident

At approximately 11 pm on Wednesday, October 27, 2004, at the same park as the first incident, a young black couple decided to engage in sexual intercourse. The male victim, a minibus taxi driver, parked his taxi in an open space. While engaging in intercourse on a blanket next to the minibus taxi, the offender crept up to them and struck the male on the head with a large rock and killed him. The offender told the female victim not to dress, displayed a knife, and took the female victim to the nearby river, approximately 20 meters from the minibus taxi, where he raped her once. Afterward, he returned to the deceased’s vehicle with the female victim, took the keys from the deceased’s pocket, and removed two cell phones from the vehicle. The victim
asked for money from her purse for transport, which the offender agreed to give to her. Thereafter, the offender set fire to the vehicle and fled the scene without giving the victim the promised money. The female victim then also fled the scene. The fire quickly burnt itself out and did not cause any significant damage to the vehicle, leaving only a burnt patch approximately half a meter in diameter in front of the first row of passenger seats.

The cause of death of the male victim was determined to be blunt force trauma to the head. There were no other wounds inflicted on the murder victim. The male died at the scene at the same location where he was struck by the offender. The bloodied rock was found at the scene approximately 1 meter from the deceased's head. The deceased was found lying on his back, next to the blanket he had placed on the ground. His shirt and shoes were on, and his pants were around his ankles. His underwear was in place, with his penis sticking out of the top of his underwear.

**The Third Incident**

In the early hours of Friday, November 26, 2004, near the scene mentioned in the second incident, the body of an adult black male was found along a footpath by a passerby. He was wearing only his underwear and a shirt. A shoe was found approximately half a meter from his body. The pants and the other shoe were not found at the scene. At the scene, a large bloodied rock was found approximately 1 meter from the deceased's head. The cause of death was blunt force trauma to the head. No female victim came forward to report any rape or assault.

**The Fourth Incident**

At approximately 9 pm on Friday, January 7, 2005, an adult Indian male left his relative's residence with his sports bag containing his personal belongings. He proceeded to the park mentioned in the previous incidents. In the early hours of Saturday, January 8, 2005, he was found unconscious with severe blunt force trauma to the head and a large bloodied rock nearby, approximately 8 meters away, down a small embankment next to where the victim was discovered. He was found wearing a yellow t-shirt and black jeans but no shoes. One shoe was found near the body. This scene was near the second incident, between the locations of the first and second incidents. A large roll of money belonging to the victim was found next to his body. He was taken to a hospital by ambulance and died 2 days later without ever recovering consciousness. His sports bag was missing from the scene. No female victim came forward to report any rape or assault.
The State's Evidence

The state's evidence was strongest on the first two incidents. Both the rape victims had pointed the offender out at either an identity parade (lineup) or a photographic identity parade. Unfortunately, there was no DNA evidence although a sexual assault crime kit was taken for each victim. The state also had a member of the public to whom the accused had mentioned that he had murdered people in the park. This member of the public alerted the police who then arrested the offender.

During interrogation, the offender admitted to murdering the men in the first two incidents but refused to do a pointing-out of the crime scenes or to make a formal confession to an independent officer or magistrate. (Recall from Chapter 8 that a pointing-out is a formal police procedure in which the offender agrees to disclose information relevant to the crime scene.) In South Africa, a confession to a noncommissioned officer of the South African Police Service (SAPS) is not admissible as evidence. However, the accused's informal confession to a member of the public that he was responsible for the murders in the park was admissible.

In the last two incidents, there were no eyewitnesses, surviving victims, or physical evidence linking the offender to the crimes. It was here that the decision was made, in consultation with the Director of Public Prosecutions, to charge the accused on the third and fourth counts of murder, relying on similar fact evidence. A linkage analysis was then compiled in support of similar fact evidence.

Methods Used in the Linkage Analysis

In this instance, the author was contacted shortly prior to the arrest of the offender by the investigating officer for assistance in the investigation. The author is responsible for assisting in all serial murder investigations conducted by the SAPS, which is a national police service. The investigating officer, attached to a Serious and Violent Crime Unit of the SAPS, had identified the series. The author traveled to consult with the investigator once the offender had been arrested. Later, the author submitted a brief report to the Director of Public Prosecutions suggesting that the offender be charged for all four murders and that the author would be able to testify in this regard. Once it was agreed to follow such a route, the author compiled the linkage analysis report for trial purposes. The following data sources were used to compile the linkage analysis:

1. Consultations with the investigating officer
2. Post-fact visits to the crime scenes
3. Plotting of the crime scenes on a handheld global positioning system (GPS)
4. Overlay of the crime scene GPS readings in a high-altitude photograph of the area
5. Examination of the police dockets, which included:
   a. Crime scene photographs
   b. Autopsy photographs
   c. Sworn statements taken by the police
   d. Autopsy reports
6. Interview with the rape victim who was involved in the first incident
7. Experience with the research and investigation of serial murders
8. Scientific literature regarding serial murder, linkage analysis, and signature analysis

Interviews were held with the offender but were not included as part of the data sources for the linkage analysis for two reasons: (1) the accused denied the accusations and, more importantly, (2) it was not the intention of the author to say that the accused committed the crimes but rather to give an opinion as to whether the crimes were committed by one offender, irrespective of who the court found guilty of the crimes. This sentiment is echoed by Keppel (1995) in his analysis of three females murdered by George W. Russell. Keppel states, “The analysis could not include any information about Mr. Russell or evidence about why he was connected to any one case” (p. 671). The steps followed were similar to those suggested by Hazelwood and Warren (2003).

The Linkage Analysis

The linkage analysis report was structured under the following headings:

1. Aim of the report
2. Information sources
3. Key terms
4. Linkage analysis
5. Conclusion

The actual linkage analysis was based on the manner in which the crimes were committed and the circumstances of the crimes.

Manner in Which the Crimes Were Committed

Tools Used to Commit the Crime

The offender displayed a weapon brought to the crime scene and used a weapon of opportunity (rock).
In the first two incidents, the offender displayed a weapon (knife) to the female victims; however, he used a weapon of opportunity from the crime scene, a rock, to kill the male companion. In all four incidents, the offender used a weapon of opportunity (rock) to murder the male victims. In each case, the rock was found near the deceased with blood stains on it.

**Cause of Death: Traumatic Head Injury**
In all four incidents, the cause of death was traumatic head injury leading to brain hemorrhage. Serial murderers tend to keep to one method of murdering.

**Method of Obtaining Victims: Blitz/Sudden Attack**
Serial murderers typically stick to one main method of obtaining their victims. In this particular instance, the offender surprised his unsuspecting victims and attacked them. All deceased died as a result of traumatic head injury leading to brain hemorrhage. The postmortem reports did not indicate any significant injuries to the limbs, which would have indicated an escalation of violence or a physical altercation between the offender and the victims.

**Sexual Theme**
In the first two incidents, the offender engaged in involuntary sexual intercourse with his victims. In the third incident, the deceased was found without his pants on.

**Signature**
Signature refers to a unique combination of events and behaviors exhibited by the offender. This is often referred to as a “calling card.” In these instances, it can be said that the sudden lethal attack of adult males with a rock is the signature of the offender. Further, the lack of theft of opportunistic items of value appears to be a signature of the offender.

**Circumstances of the Crimes**

**Time of Crimes: Nighttime**
In these crimes, the offender targeted victims during the nighttime. Serial offenders often remain consistent in the manner in which they commit their crimes.

**Geographic Pattern of Crime Scenes**
These crimes were committed in close geographic proximity to each other. The distance between the location of the first incident and the location of the third incident
(the two crime scenes farthest apart) was 1.2 kilometers. The distance between the second incident and the fourth incident was 50 meters.

**Victimology**

The offender targeted two types of victims. His rape victims were black adult females, and his murder victims were adult males (three black, one Indian). Serial murderers tend to be consistent with their victimology. Of serial murderers in South Africa, 40% include victims of multiple races in their series, and 34% include victims of both genders.

**Findings of the Court**

The court found the accused guilty on all charges. The court referred to the testimony presented to the court by the author and accepted it. The court concurred that the crimes were similar and unique enough for it to conclude that the accused was responsible for all the murders. The accused received five life sentences (four for murder and one for the rape of a minor child), 10 years for the rape of an adult female, 30 years for two incidents of robbery with aggravating circumstances, and 12 months for malicious injury to property. In South Africa, an accused is charged with each crime committed, not just the most serious crime. While the offenses were committed in four separate incidents, the sentences are served concurrently.

**CASE EXAMPLE: THE QUARRY SERIAL MURDERS**

**Background of the Cases**

From January to September 2002, the bodies of five unidentified adult black females were found along a small river near a highway just outside the city of Pretoria in South Africa, near a township known as Olievenhoutbos. These five cases were initially investigated as part of another series of bodies found along highways, known as the Highwayman series; however, when the Highwayman suspect, Elias Chauke, was arrested, it was found that he was in jail for an unrelated crime during the time of these five murders. Chauke was subsequently convicted for five other murders. These remaining cases that occurred during Chauke’s imprisonment were eventually closed off as unsolved. Then in early January 2006, two bodies of adult black females were found approximately 2.8 kilometers from the nearest 2002 body. This discovery sparked concerns that the same offender was again committing murders after a 4-year hiatus. The 2002 task team was reformulated with the author as the head of the team. This series was labeled the “Quarry” murder series due to the bodies being found in close proxi-
inity to a nearby quarry. From January to September 2006, a total of 11 adult black females were murdered, and a 12th case, that of attempted murder, also took place. To date, only 6 of the 16 murder victims have been identified, a common problem experienced in South Africa.

The State's Evidence

In 8 of the 16 murder cases, there was evidence linking that offender to the crimes. This evidence was in the form of either cell phone evidence in two cases (the offender was in the possession of two victims' cell phones), DNA in four cases (from vaginal swabs), or a formal pointing-out of the crime scene in seven cases. Only one case had all three of these evidential aspects. In the other eight murders, there was neither physical nor eyewitness evidence linking the Quarry suspect, Richard Nyauza, to those murders.

Initially, the state prosecutor only wanted to indict the offender on the eight murder cases for which there was one of the three evidential aspects, and on the attempted murder for which there was eyewitness evidence and circumstantial evidence to link the offender to the offense. Negotiations were held between the task team and the prosecutor about charging the offender on all cases. Eventually, the prosecutor agreed to do so.

The Linkage Evidence

This linkage analysis differed slightly from the preceding Newcastle example in that firstly a linkage analysis was done on the five 2002 cases, then an analysis was done on the eleven 2006 murders, and finally an overall analysis of the 2002 and 2006 cases was done in one report. This approach was due to the 4-year gap between the first part of the series and the second part of the series.

Linkage Analysis: 2002 Murders

The linkage analysis was based on the manner in which the crimes were committed and the circumstances of the crimes.

Manner in Which the Crimes Were Committed

Tools Used to Commit the Crime

The tools used were objects that can cause blunt force, but not penetrative, trauma. No weapons were found at the scenes.
CHAPTER 10 / The Use of a Linkage Analysis

Cause of Death: Traumatic Injury
In three of the five murders from 2002, the cause of death was blunt force to the victim's body (head and torso). In the other two cases, the cause of death could not be determined by the pathologist at the postmortem examination.

Method of Obtaining Victims
It is unknown how the suspect obtained his victims, as none have been identified. Most South African serial murderers use a con story to lure victims away. It is highly likely that this MO was used in these cases.

Sexual Behavior
In none of the cases could it be determined by medical examination that the victims had been raped. There was, however, a sexual theme in four of the five murders, either in the form of nakedness of the victims or semen found.

Signature
In these instances, the suspect's signature can be described as targeting adult black females and leaving their bodies out in the open, usually in or near water, in close proximity to each other.

Circumstances of the Crimes
Time of Day of the Crimes
This could not be determined because none of the victims were identified and their last movements were therefore unknown.

Geographic Pattern of Crime Scenes
The crime scenes were all extremely close to each other. The greatest distance between any two crime scenes was 1.3 kilometers. The closest distance between any two scenes was 51 meters (the last two scenes of 2002).

Serial murderers tend to cluster their crime scenes together. The first two scenes of 2002 were slightly farther out, with the final three scenes being extremely close together.

Victimology
All victims were adult black females. Serial murderers often tend to keep to a particular victimology.
Linkage Analysis: 2006 Murders

As before, the linkage analysis was based on the manner in which the crimes were committed and the circumstances of the crimes.

Manner in Which the Crimes Were Committed

Tools Used to Commit the Crime

In most of the cases, the suspect used weapons that were not left at the scene.

Cause of Death: Strangulation

The predominant cause of death was strangulation (5 out of 11 cases). In five cases, the cause of death could not be determined at autopsy. One incident toward the end of the series involved stabbing the victim. Strangulation is typically the most common cause of death in serial murder cases. South African serial murderers have been known to alter their method of killing during a series. This inconsistency is either due to experimentation, unforeseen events that take place during the actual murder (such as victim resistance or the presence of passersby), or a change in MO that leads to a change in the method of murdering.

Method of Obtaining Victims: Con Story

Most South African serial murderers use a con story to lure unsuspecting victims. The most common con story is the offer of employment. Both Evelyn Dube and Molline Gunduza had come to Olievenhoutbos to sell metal pots and containers on the day of their respective disappearances. They were subsequently found near Rossway Quarry with their wares near them. Selina Mahlangu had traveled from KwaMhlanga (Mpu malanga Province) to meet with the suspect, who had offered her employment. Rosina Mosvana last had contact with her sister informing her that she was in Olievenhoutbos and that someone had offered her employment.

Sexual Behavior

Ten of the eleven 2006 murders had a sexual theme based on the crime scene, as indicated by nakedness or partial nakedness, rape, or semen. Most serial murderers in South Africa commit sexual serial murders.

Signature

The suspect's signature in the 2006 series was the targeting of adult black females for sexual murders by means of strangulation and leaving their bodies in or around the Rossway Quarry.
Circumstances of the Crimes

Time of Day of the Crimes
In the cases where the victims have been identified, they all went missing during the daytime.

Geographic Patterns of the Crime Scenes
The crime scenes from the 2006 cases were all close to each other, again, consistent with the behavior of serial murderers in South Africa and elsewhere. As with the 2002 cases, some of the bodies were found in or next to the Riet River—victims 6 and 8, both unidentified, and victim 10, Evelyn Dube.

Five of the eleven 2006 bodies were found among the rocks on the perimeter of the Rossway Quarry: victim 11, Molline Gunduza; victim 12, unidentified; victim 13, Selina Mahlangu; victim 14, unidentified; and victim 15, Elizabeth Mabasa. Victims 14 and 15 were found at the exact same location.

The following victims were found in the field near the quarry, in close proximity to each other: victim 7, unidentified; victim 9, unidentified; and victim 16, Rosina Mosvana.

Victimology
All victims were adult black females. Serial murderers often tend to keep to a particular victimology.

Overall Report
Across both series, the suspect preferred adult black females. Serial murderers tend to have an ideal victim. A category of victim (e.g., black adult females) is selected because it has some relevance to the offender. Often, hatred is developed within the individual for the victim group as a result of his or her own life experiences. Usually, perceived maltreatment by women is the main reason for targeting this group.

In the 2002 cases, the offender committed his first two murders outlying, then moved toward a central point, with the last three murders being within a very close proximity to the Riet River (Table 10.1). In the 2006 cases, the offender moved from the river and field to a central point, Rossway Quarry. He therefore exhibited the same pattern of movement in both the 2002 and 2006 series. The offender had three main crime scene groupings: (1) near the N14 highway where the Riet River intersects; (2) at the Rossway Quarry; and (3) near the golf estate.

In the 2002 series, the offender seemed to prefer using blunt force to murder his victims. In the 2006 series, the offender seemed to have developed and preferred stran-
gulation, although there was one incident of stabbing and one incident of strangulation and blunt force trauma. This pattern of having more than one cause of death is not uncommon in South African serial murderers. An offender may begin using one dominant method and later use another, more satisfying method of murdering victims. There was a hiatus of 3 years between the 2002 and 2006 series in which the events in the offender's life could have led to his preferring a new method of murdering his victims.

In all except the last murder, there was a sexual theme, as described previously. A sexual theme tends to be consistent in a series where the murders are sexual in nature, as this has to do with the offender's inner motive for targeting his victims. In cases where no sexual theme is observed at the crime scene, it is often due to a disruption in the crime process, such as victim resistance or behavior, presence of passersby, or the mood or temperament of the offender.

The signature in both instances tended to be the suspect targeting adult black females and then leaving their bodies out in the open, usually in or near water, in close proximity to each other.

**Conclusions of the Report**

It is the opinion of the author of this report that the offenses referred to in this report were committed by the same offender. The uniqueness of the behaviors and circumstances accompanying these crimes are indicative of one offender and are unlikely to be imitated by another offender in such a similar fashion, due to the psychological motivation of such offenders. To date, the author has not come across copycat offenders in the serial crime investigations that he has assisted on.

**Findings of the Court**

The trial was held in the High Court in Pretoria, South Africa. South Africa has an adversarial system but no jury. Hence it is up to the judge, and his or her assessor(s), to deliver a verdict and impose a sentence. The trial lasted 5 court days from start to finish. In the end, the judge and his assessor (a magistrate) convicted on all counts for which the accused was indicted. In the eight cases where there was no direct evidence, the accused was found guilty based on the evidence tendered by the author, with the judge and his assessor relying on the legal principle of similar fact evidence.

In his judgment, Judge Murphy stated the following:

*The last issue then is whether the linkages are sufficient to establish that the accused is the perpetrator of the crimes of the remaining 8 counts... where there*
is no other evidence linking the accused. We believe that such evidence is indeed sufficient. Were we to reject it as insufficient we would in effect be concluding, despite the strikingly similar geographic, signature and method evidence, that these victims landed in the two series by sheer coincidence or their killings were the work of a copycat killer with insider information regarding the geographic profiling, signature and modus operandi. The possibility of such a coincidence is remote in the extreme and we accept the evidence of Dr. Labuschagne that a copycat killer can be safely ruled out. In the result, therefore, I find the accused guilty of all the charges proffered against him in counts 1–24. (State v. Nyanza, 2007, p. 49)

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Victimology</th>
<th>Location</th>
<th>Sexual Theme</th>
<th>Cause of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>289/01/2002</td>
<td>Adult black female</td>
<td>Field near the N14 highway</td>
<td>Yes</td>
<td>Undetermined</td>
</tr>
<tr>
<td>502/04/2002</td>
<td>Adult black female</td>
<td>Riet River</td>
<td>Yes</td>
<td>Blunt force</td>
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<tr>
<td>293/06/2002</td>
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<td>Riet River</td>
<td>Yes</td>
<td>Blunt force</td>
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<tr>
<td>442/06/2002</td>
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<td>Riet River</td>
<td>No</td>
<td>Blunt force</td>
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<td>Adult black female</td>
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<td>Undetermined</td>
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<td>Riet River</td>
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<td>Strangulation</td>
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<tr>
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<tr>
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<td>Drowning and strangulation</td>
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<tr>
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<td>Undetermined</td>
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<td>463/09/2006</td>
<td>Adult black female</td>
<td>Field near golf estate</td>
<td>No</td>
<td>Strangulation</td>
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</table>
CONCLUSION

Linkage analysis has proven to not only be a valuable tool for investigators of serial offenses but also a useful tool during a trial as evidence. A growing body of research is finding support for the hypotheses underlying linkage analysis. While the concept of a linkage analysis has been understood and put into practice for investigative purposes for decades, its application to trial proceedings is relatively new. The rules of evidence will determine if such an analysis is admissible, along with the author of the analysis being qualified as an expert in court, depending on local legal requirements. In the future, it might be more relevant for behavioral analysts to focus on presenting linkage analysis testimony as opposed to profile evidence in the courtroom.