**DEFINITIONS:**

Crime Scene Reconstruction- The use of scientific methods, physical evidence, deductive reasoning and their interrelationships to gain explicit knowledge of the series of events that surround the commission of a crime.  
-Association for Crime Scene Reconstruction, The Scene, 4(1), Jan 1997, p. 2.  
  
Criminal Profiling- The application of psychological theory to the analysis and reconstruction of the forensic evidence that relates to an offender's crime scenes, victims and behaviors.  
- Turvey, B., "CP101: An Introduction to Criminal Profiling", Online Course,   
http://www.corpus-delicti.com, May 1997.

**INTRODUCTION**

While both of these activities may appear to be similar and are in fact related, it is important to note that they are not the same. The difference between the two is most easily understood by looking at which questions about the crime they attempt to answer.1,2,3,4Crime Scene Reconstruction looks at the physical evidence and attempts to determine "What happened?" and "How did it happen?".5,6 Criminal Profiling looks at the physical evidence and the reconstruction and attempts to determine "Why may this have happened?" and "What does that tell us about Who may have done it?".7 It is important to keep in mind that only those directly involved in the crime know for sure what happened and why, and they may be unable or unwilling to say. 8,9

Why is it important to reconstruct the crime prior to profiling the offender? The answer is simple; until you know what happened, and how it happened (at least as much as possible), you have no basis for attempting to determine why and who.

This paper is intended as an overview of the types of reconstruction which may be possible and is not all inclusive (the number and types of things that may be reconstructed is like types of physical evidence- nearly limitless). For more specific information check the references or contact an expert in the field in question.

**TYPES OF RECONSTRUCTION**

(Lee, pp. 192-3, lists 5 categories of reconstruction; one deals only with the amount of reconstruction done, and another lists several activities including criminal profiling which are not truly reconstruction).10

1. Specific Incident Reconstruction (Traffic Accident, Homicide, Bombing, etc.).
2. Specific Event Reconstruction (Sequence, Direction, Condition, Relation, Identity).
3. Specific Physical Evidence Reconstruction (Firearms, Blood, Glass etc.).

In any given scene it may be possible to do a total or only partial reconstruction, and the reconstruction may use more than one technique (i.e. both trajectory and blood stain pattern reconstruction to locate the position of the victim).11 Some scenes lend themselves to reconstruction better than others. Traffic accidents are common scenes to reconstruct and often can be thoroughly reconstructed. Vehicles are rather massive objects that obey the laws of motion and often leave a wealth of physical evidence behind before, during and after an accident. It may be possible to show the entire sequence of events from the time the vehicles first enter the area of the accident until they come to rest following the accident.12,13,14

Scenes involving the movement of people are more difficult. While it may be possible to say where a person was in the scene at several points in time, the manner in which they moved in the scene cannot be reconstructed. People may move slowly, quickly, hesitantly, jump up and down, run, skip, fall down, etc. all without leaving any particular trace behind. That said, there are of course the odd cases where the amount and type of physical evidence does allow the paths of the participants to be tracked with some accuracy; however, the vagaries of facial expression, gestures, and body language are simply impossible to reconstruct at all.15,16

Below are some examples of the types of information which reconstruction may provide, again, this is not an all inclusive list. Some items also appear in more than one category, and it may be possible to use information from several areas to complete or validate the final reconstruction.

**EXAMPLES OF TYPES OF RECONSTRUCTION:**

* Blood and Blood Stain Pattern Analysis17,18
  + Identity of victim/offender.
  + Position and location of the victim.
  + Position and location of the offender.
  + Movement by the victim/offender in the scene.
  + May identify the location of the scene (if the victim is removed and left elsewhere).
  + May indicate a staged or secondary scene.
  + Minimum number of blows struck.
  + Type of weapon used.

* Documents19,20
  + Reassemble torn/shredded papers.
  + Recovery of obliterated writing.

* Firearms21,22
  + Trajectory.
  + Shooting distance.
  + Position and location of the victim.
  + Position and location of the offender.
  + Sequence of shots.
  + Direction of shots.
  + Possibility that the wound(s) could have been self-inflicted.
  + Identification of weapon used may link serial cases.

* Functional Evidence23  
  + Does the weapon or vehicle function properly?
  + Semi-automatic with slide locked back may indicate last round was fired.
  + TV or coffee pot on at scene.
  + Do door/window locks properly secure?

* Glass24,25
  + Direction of break (from which side of the glass).
  + Sequence of shots (it should be noted that current research indicates that sequencing of shots through laminated automotive glass is not reliable).

* Impression Evidence (Fingerprints, shoe prints, tire tracks).
  + Identity of victim/offender.
  + Place victim/offender at the scene and at specific sites in the scene.
  + Fingerprints may indicate where the offender/victim was in the scene or how an object was held.
  + Shoe prints may show location in and movement through the scene.
  + Tire tracks may show vehicle position and direction of travel and may indicate the type of vehicle driven.

* Ligature26
  + Type of ligature used (if missing).
  + Use of same/similar ligature can be used to link serial cases.
  + Type of ligature used may indicate offender's occupation or interests. (i.e. rope tied with knots commonly used by dock workers or climbers).

* Pathology27
  + Manner of death (Homicide, Suicide, Natural, Accidental).
  + Time of death (approximate).
  + Cause of death/weapon used.
  + Time before incapacitation from wounds (approximate).
  + Whether injuries were sustained pre- or post-mortem.
  + Identity and/or age of victim.
  + Was victim sexually assaulted, and in what manner.
  + Possibility that the wound(s) could have been self-inflicted.

* Physical Match (Reassembly of broken objects). 28
  + Bombs.
  + Vehicle lamps, mirrors and windows.
  + Aircraft which have crashed and/or exploded.

* Relational/Positional Evidence29
  + Blood drops on the threshold of a door indicates that the door was open when the blood was shed.
  + Location of other objects and their condition may also indicate a variety of things depending on the specifics of the crime.

* Trace Evidence30,31
  + Trajectory of projectiles based on retention of material through which they have passed.
  + Place offender/victim at the scene, and at specific sites in the scene.
  + Describe the environment of an unknown crime scene.
  + May indicate offender occupation.

* Vehicle positions, speeds, sequence of accident events.

**INFORMATION NEEDED FOR RECONSTRUCTION**

Generally speaking it is best to go to the scene, preferably at the time of the incident. Information may come from physical evidence, witness statements, and the reports of other experts. The reconstructionist should examine all scene photographs, autopsy protocol and photographs, measurements, drawings, notes, reports and items of evidence. Complete and accurate documentation of the scene is essential. Depending on the type of reconstruction being done this may include some different things such as the height and vertical/horizontal angles of shots into a wall, or the length and width of a bloodstain. 32

**STEPS IN RECONSTRUCTION**

1. Recognition of evidence.
2. Documentation of evidence.
3. Collection of evidence.
4. Evaluation of evidence.
5. Hypothesis.
6. Testing.
7. Reconstruction. 33,34

Step 1, recognition of evidence, is arguably the most important, as Lee points out "Unless the potential evidence can be recognized, no further reconstruction can be carried out." 35

Steps 1-3, recognition, documentation and collection of evidence, are the heart of any successful scene investigation, and form the basis for the reconstruction.

Step 4, evaluation of evidence, examines the evidence (possibly following laboratory analysis) and looks at what information the evidence provides, and how reliable it is. At this time any witness statements should be compared to the evidence to see which parts of the statements can be supported or refuted by the evidence.

Step 5, hypothesis, is the formulation of an idea of how the event(or portions of it) occurred. This is not merely conjecture and should be firmly supported by the evidence.

Step 6, testing, looks to see how the hypothesis developed in 5 can be validated. This is accomplished by checking the evidence against known physical laws or devising a test to attempt to replicate the event(or the relevant segment).

Step 7, reconstruction, is the reporting of the results of the analysis. The results are reported as a range, where the event(or portions of it):

1. Can be shown to have occurred in a given manner.
2. Can be shown to be likely to have occurred in a given manner.
3. Can be shown to be unlikely to have occurred in a given manner.
4. Can be shown not to have occurred in a given manner.

**APPLICATION TO PROFILING**

The reconstruction forms the foundation from which the profiler can begin. The reconstruction provides answers about what happened and how it happened. From there the profiler can begin asking "Why?" questions. Questions of "Why?" are not answered by the reconstruction. Neither are questions of Intent and Motive. Attempts to answer these questions may be investigatively useful, but lack the firm support of evidence required of reconstruction36,37. Authors on both reconstruction and profiling speak of mentally re-enacting the events of the crime; again, this can be investigatively useful, but is not reconstruction. 38,39

As profiling is intended as an investigative tool, it attempts to go beyond the reconstruction, and answer questions of intent and motivation. From these admittedly subjective answers it can provide a clearer picture of the offender.

As an example, take a scene where the reconstruction shows as Event 1- "Subject breaks into residence through rear window. Window lock was previously secured and was jimmied with a thin, wide, black metal pry bar." Based on this information the profiler can begin to look at "Why?". Why did the offender choose this window? Why did he use this method of entry? Has it worked for him in the past? Where did he get the pry bar? Did he bring it with him or acquire it at the scene? The profiler can continue in this fashion through the scene, looking at the known facts, and then attempting to address the motivations behind the known actions. Working through the scene in this manner will also serve to highlight both the Modus Operandi and Signature aspects of the crime.

* Modus Operandi is the "method of operation", those things that the offender does which are necessary for the completion of the crime (method of entry, use of a weapon to control the victim, etc.).
* Signature is defined as those things done by the offender which are not necessary for the completion of the crime, but which the offender must do to satisfy himself (use of complex ligature, sadism, etc.).40

The reconstruction may show a sequence of events or actions that are unnecessary in the commission of the crime. In serial cases the recurrence of the same sequence at multiple scenes, or the modification of parts of it, may also assist in this determination.

**A CASE STUDY: THE MURDER OF DONNA LYNN VETTER**

Donna Lynn Vetter was a 22-year old, white female. She worked as a stenographer for the FBI field office in San Antonio, Texas. On September 4, 1986, she was raped and murdered in her apartment. Ms. Vetter was last seen alive at 9:10PM, by a neighbor. She was found dead at 10:35PM; this places the occurrence of the offense to within a period of just over one hour. During this time the following events took place:

1. Offender enters the apartment by pulling out the screen on the otherwise unsecured front window, knocking over a plant on his way in.
2. Offender unplugs the telephone.
3. Initial contact between the offender and the victim occurs near the bathroom. Victim is struck in the face.
4. Assault continues in the kitchen area where the offender obtains a knife. The victim is stabbed repeatedly and her clothing cut and/or torn off.
5. Offender drags the victim from the kitchen, through the dining room into the living room, leaving a blood trail along the way.
6. Offender sexually assaults the victim in the living room.
7. Offender hides the knife under a seat cushion in the living room.
8. Offender leaves the scene.
9. Unplugging the telephone (which is unnecessary if he intends to kill the victim).
10. Blitz type assault intended to render the victim compliant.
11. Use of a weapon of opportunity (i.e. the kitchen knife), rather than one brought to the scene by the offender.
12. The fact that nothing was stolen from the apartment.

In this case the victim's continuing resistance led to an escalation of violence and ultimately to her death. When combined with the victimology and geoforensic information, the reconstruction allowed a thorough profile of the offender to be completed. 41,42

**CONCLUSION: THE IMPORTANCE OF COMPETENT CRIME SCENE WORK IN RECONSTRUCTION AND PROFILING**

Unless the analyst (reconstructionist or profiler) is one of the scene investigators, the basic scene work will likely already be completed, and any deficiencies will probably be impossible to correct. This may limit the information which the analyst can provide. To this end the need for continuing/advanced training for scene investigators cannot be overstated. While much of the evidence used for reconstruction speaks for itself and can be documented and collected using standard crime scene procedures, some types of reconstruction require specialized information.

The main three types would be Blood Stain Pattern, Traffic Accident, and Trajectory Reconstruction. All three types require specialized knowledge of what evidence to look for at the scene, and what documentation (photographs, measurements, etc.) are required to utilize the evidence in reconstruction.

An investigator at a traffic accident must know the difference between skid and yaw marks, for example. He must be able to document that the mark is a yaw rather than a skid, and know that each mark must be measured differently. Measurement of the length of a yaw mark is not much use in reconstruction.

Similarly a photograph of a bullet hole does not allow for trajectory reconstruction. We must know the position, height and angle at least, and knowledge of the direction is helpful.

A great deal of specialized knowledge is required for the proper interpretation of blood stain patterns. Without this knowledge the investigator may not even know what he needs to document, let alone how to do it.

Without competent, thorough scene work, the subsequent analysis may be incomplete or impossible.

**REFERENCES:**

1. Bevel, T., "Crime Scene Reconstruction," Journal of Forensic Identification, 41(4), 1991, pp. 248-54.  
2. Garrison, D. H., "Shooting Reconstruction vs. Shooting Reenactment," AFTE Journal, 25(2), April 1993, pp. 125-27.  
3. Lee, H., Crime Scene Investigation, Central Police University Press: Taiwan, 1994, pp. 191-205.  
4. Garrison, D. H., "Why Crime Scene Reconstruction Does Not Answer the Why? Question," MAFS Newsletter, April 1996, pp. 54-56.  
5. Garrison, D. H., "Shooting Reconstruction," pp. 125-27.  
6. Garrison, D. H., "Why," pp. 54-56.  
7. Turvey, B., "CP101: An Introduction to Criminal Profiling", Online Course, http://www.corpus-delicti.com, May 1997.  
8. Garrison, D. H., "Why," pp. 54-56.  
9. DeForest, P., Gaensslen, R., Lee, H., Forensic Science: An Introduction to Criminalistics, McGraw Hill: New York, 1983, p. 45.  
10. Lee, H., Crime Scene Investigation, pp. 191-205.  
11. DeForest, P., Gaensslen, R., Lee, H., Forensic Science, p. 295.  
12. Garrison, D. H., "Shooting Reconstruction," pp. 125-27.  
13. Lee, H., Crime Scene Investigation, p. 192.  
14. Turvey, B., "A Guide To The Physical Analysis Of Ligature Patterns In Homicide Investigations," Online Article, http://www.corpus-delicti.com, May 1997.  
15. Garrison, D. H., "Shooting Reconstruction," pp. 125-27.  
16. DeForest, P., Gaensslen, R., Lee, H., Forensic Science, p. 45.   
17. Ibid., pp. 295-308.