11

A SCIENTIFIC MODEL OF PROFILING

Thus far in this book, on the basis of the investigative and forensic science practice literature, the types of crime scene evidence that are typically available and submitted for analysis by law enforcement investigators have been described. The process of crime reconstruction, in which attempts are made to translate these pieces of crime scene evidence into a narrative of crime events and offender behaviors has been discussed and evaluated. Next, the examination of crime scene evidence, offender motives, personality, and behavior in chapters 7 through 10 identified pieces of the science that can be used to build a new scientific model of profiling. Chapters 8 through 10 further demonstrate the primacy of behavior as an expression of both motive and personality. Finally, using arson and sex offending as examples from the psychological and criminological literature, relationships between motive and behavior and personality and behavior have been selectively examined.

Consistent with much of the empirical literature in the fields of psychology and criminology, the arson and sex offending literatures have approached the study of motive and personality, respectively, by examining limited, often bivariate relationships between variables of interest (e.g., personality type and type of sex offense; motive and age). The isolated cases in which these relationships have described situations relevant to investigation (e.g., increased violence in the sexual offenses of psychopaths), along with select findings from the multidimensional scaling research specific to profiling,

have provided a promising although modest look into what a scientific model of profiling may be able to offer to the practice of criminal investigation.

Even the most promising findings, however, represent only pieces of profiling. For example, the prediction that an offender who kidnaps a victim and commits an uncharacteristically violent sexual offense is likely to have personality characteristics consistent with psychopathy, although potentially useful, represents only a portion of what investigators would need to know to successfully identify and apprehend the correct perpetrator. Likewise, the findings of differences in motive types between juvenile and adult arsonists are still insufficient for advancing investigative practices because they do not provide a comprehensive set of offender characteristics that would narrow down a suspect pool sufficiently to identify and apprehend the correct perpetrator.

To a great extent, the lack of comprehensiveness in the profiling literature on offender characteristics is simply an artifact of empirical study. In science, knowledge about a phenomenon is achieved through the gradual accrual of studies examining manageable, precise relationships between aspects of the phenomenon of interest. Thus, studies in the offender literature have related individual offender characteristics (e.g., motive) to individual behaviors (e.g., fire setting) and small sets of personality characteristics (e.g., a proposed cluster of pedophilic personality traits) to subsets of behavior (e.g., child molestation vs. rape) in the hope that these individual findings will eventually produce a collective body of literature that will describe the larger world of offenders and their offenses. Although the process of conducting these individual studies of the relationships between small numbers of variables will gradually add to the knowledge base of criminal offending, a scientific model of profiling requires the conceptualization and investigation of a broader picture of profiling-related variables. This is because the task of making the kinds of investigative predictions necessary to profiling requires understanding the relationships and pathways that link multiple sets of variables rather than the simple bivariate relationships predicted by many offender studies. Indeed, as demonstrated by chapters 8 through 10, the offender characteristics of motive, personality, and behavior do not lend themselves easily to simple bivariate analyses. Instead, multiple variables, some observable and some latent, are proposed to interact in the commission of a given crime.

This chapter describes in greater detail what this proposed broader picture of profiling involves, in preparation for a discussion of the steps necessary to begin empirical testing. First, a conceptual scientific model of profiling is proposed. This model incorporates the components of crime scene evidence, motive, personality, and behavior and describes their interaction. Second, the homicide research conducted by Canter and colleagues is re-

viewed to describe and evaluate the only other current scientific approach that studies variables of offender motive, personality, and behavior simultaneously. This research will be evaluated to assess its relationship to the proposed scientific model of profiling and to identify contributions that can be made to a science of profiling from this literature. Finally, the role of situational factors in crime is discussed, and their incorporation into the proposed scientific model of profiling is described.

MODEL OF CRIME SCENE EVIDENCE, MOTIVES, PERSONALITY, AND BEHAVIOR

In chapters 7 through 10, the components of a scientific model of profiling are described, and bivariate relationships among crime scene evidence, motives, personality, and behavior, are discussed and illustrated with examples from the offender literature. As previously mentioned, however, these types of relationships do not comprehensively represent the multiple relationships between variables that are at work in any given crime. Instead, they illustrate only pieces of a larger model of offending. This larger model of offending, using the same variables described in chapters 7 through 10, is presented in Figure 11.1. This model includes the same types of bivariate relationships already discussed but also allows for more complex interrelationships among variables that are currently unaccounted for by much of the offender literature. The same model of offending, using an example of a murder to illustrate the relationships among variables, and to assist the reader with the following description of the model's components, is presented in Figure 11.2.

There are three important points to note before discussing this model. First, although the model and example described in Figures 11.1 and 11.2 are more comprehensive in terms of the types of relationships described, they are nonetheless pared-down versions of what an investigator would see in an actual crime. The model is presented in its simplest form to clearly describe the components and the proposed relationships among components. Thus, in the murder example, the crime scenario contains only three pieces of crime scene evidence—a fraction of what would be expected in a true murder investigation. Second, depending on the type of crime, the nature and quality of crime scene evidence, and the reliability and validity of the relationships linking the model's variables, a model of profiling could take multiple forms. A more complex model and example is presented after this initial description to illustrate how the models for different crime scenarios may differ. Third, the predictors and relationships between variables provided in the murder example (and in the burglary example that follows

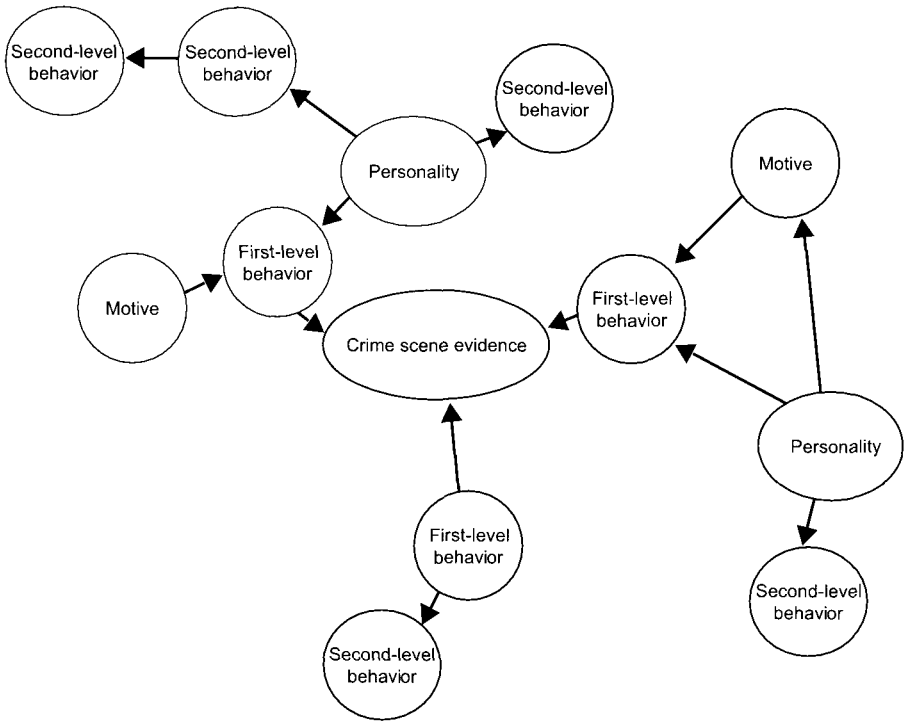

Figure 11.1. Basic structure of a scientific model of profiling.

later) are hypothetical. Given the current paucity of research providing reliable and valid links among behaviors, motive, and personality, as described in chapters 8 through 10, there is currently no basis on which to assert clear predictors and specific relationships between variables (e.g., hostility predicts previous assaultive behavior). Thus, the predictors and relationships in the examples, although they have face validity and are logically derived, have not yet been borne out by research. As discussed in chapter 12, this is an area that requires further empirical study.

As demonstrated by Figure 11.1, the basic structure of a scientific model of profiling is that of a branching cluster of variables that can be organized into tiers of predicted relationships. The relationships specific to the commission of the crime of interest point inward toward the most central set of variables: the crime scene evidence. The relationships specific to the behaviors of the offender that may assist in identifying and apprehending him branch outward from the crime-related variables, with the terminal point of each branch being an investigation-relevant offender behavior. Organized around this structure, the most basic profiling model can be described in three tiers as follows.

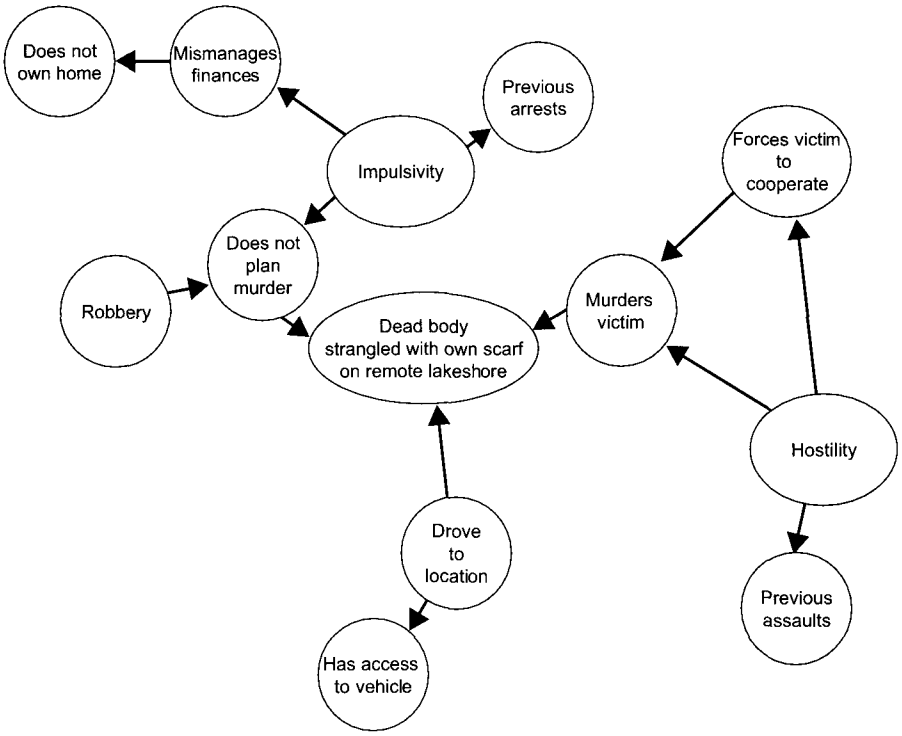

Figure 11.2. An illustration of the application of Figure 11.1.

Tier 1: Crime Scene Evidence and First-Level Offender Behaviors

As illustrated in Figure 11.1, crime scene evidence is at the center of this model of profiling, representing the only available information that an investigator is likely to have to use in solving a crime. In the hypothetical murder scenario described in Figure 11.2, this crime scene evidence consists of a dead body found on a remote lakeshore that has been strangled with the victim's own scarf and is missing its identification. One possible narrative of this example that would be consistent with the modeled variables is that the offender approaches the victim to rob her, but the situation quickly escalates to murder. During the attempted robbery, the victim refuses to comply with the offender's demands, and through his attempts to force the victim to cooperate, the offender strangles the victim with her own scarf. The offender then takes the victim's purse and drives to a remote lakeshore, accessible only by car, to dispose of the victim's body and facilitate his escape.

According to the model in Figure 11.1, the crime scene evidence is directly predicted by first-level offender behaviors. Recall from chapter 8

that first-level behaviors have also been referred to as *inferred behaviors*. This is because, for the purposes of investigation, the direction of the predictions in this portion of the profiling model is reversed through the process of crime reconstruction, such that the behaviors are inferred from the crime scene evidence. When considering how these relationships operate in the commission of a crime, however, it is the offender's behaviors that predict the evidence that will be left behind. These behaviors are referred to here as *first-level behaviors* because they are directly related to the criminal act and, hence, the crime scene evidence. These behaviors are to be distinguished from *second-level behaviors*, which are the investigation-relevant behaviors that can be predicted from variables in the model but are not necessarily related to the commission of the crime. In the murder example, the first-level behaviors that predict the crime scene evidence are murdering the victim (predicts the presence of a dead body), committing an unplanned offense (predicts that the victim was strangled with her own scarf, rather than being killed by a weapon that was brought to the scene by the offender) and driving to the body dump location (predicts the body's remote location).

Tier 2: Motive, Personality, and First-Level Offender Behaviors

In the second tier of variables, aspects of motive and personality predict the first-level offender behaviors that predict crime scene evidence. In Figure 11.2, the offender's motive to rob the victim (motive variable) as well as his impulsivity (personality variable) predict the unplanned commission of the murder. Likewise, the offender's hostility (personality variable) and motivation to force the victim to cooperate (motive variable) predict the murder of the victim. These relationships thus represent the manifestation of the latent constructs of motive and personality as behavior described in chapter 8. These links, from motive and personality to first-level offender behaviors, are also the subject of the studies reviewed in chapters 9 and 10. Those chapters examine the types of predictions that could potentially be generated about crime behaviors by looking at aspects of motive and personality. Again, these predictions represent the proposed direction of causality in the commission of the crime; that is, aspects of motive and personality are thought to cause the crime behaviors that, in turn, lead to the crime scene evidence. In an investigation, profilers would use information gleaned from research on motive and personality to make predictions in the reverse—using first-level offender behaviors to draw inferences about motives and personality characteristics.

Tier 3: Motive, Personality, and Second-Level Offender Behaviors

In the third tier of variables, the proposed direction of causality changes away from predicting crime scene evidence to predicting the behaviors that will assist in identifying and apprehending an unknown perpetrator. This shift in direction reflects the hypothesis that the same motive and personality characteristics that predict crime-related (first-level) behaviors will also predict the offender's non-crime-related (second-level) life behaviors. It is also proposed that certain crime-related behaviors will directly predict life behaviors without the consideration of motive or personality. Thus, in this tier of variables second-level offender behaviors are predicted by both motive and personality characteristics and by first-level offender behaviors. For example, in Figure 11.2, the same impulsivity (personality variable) that predicts the offender's crime-related behavior of committing an unplanned murder also predicts that he will have acted in such a way as to have an arrest record and to have mismanaged his finances (second-level life behaviors). For investigative purposes, although impulsivity may not be of great utility in identifying and apprehending a perpetrator, the manifestation of impulsivity as an arrest record and poor credit history may help narrow down the suspect pool. Likewise, in Figure 11.2, the first-level crime-related behavior of driving to a remote location to dump the victim's body predicts the second-level behavior of accessing a vehicle. This prediction is made without a consideration of motive or personality and is thus more similar to the types of logical inferences made in crime reconstruction.

In addition to predicting second-level behaviors, in the third tier of the profiling model, motive and personality can also become predictors of each other. Thus, in Figure 11.2, the offender's hostility (personality variable) may make him more inclined to want to force the victim's cooperation in the robbery (motive variable). These variables may then act in concert to result in the offender murdering the victim. The relationship between motive and personality, and their mutual relationship to behavior, is a further area that has thus far been neglected in the profiling literature and requires future research.

Branches of Predictions Beyond Tier 3

Once the direction of causation shifts away from crime-related behaviors, and aspects of motive, personality, and first-level behaviors are used to make predictions about second-level behaviors, the pattern of relationships continues to branch outward toward predicting additional second-level behaviors. Figures 11.3 and 11.4 depict a more complex profiling model, in

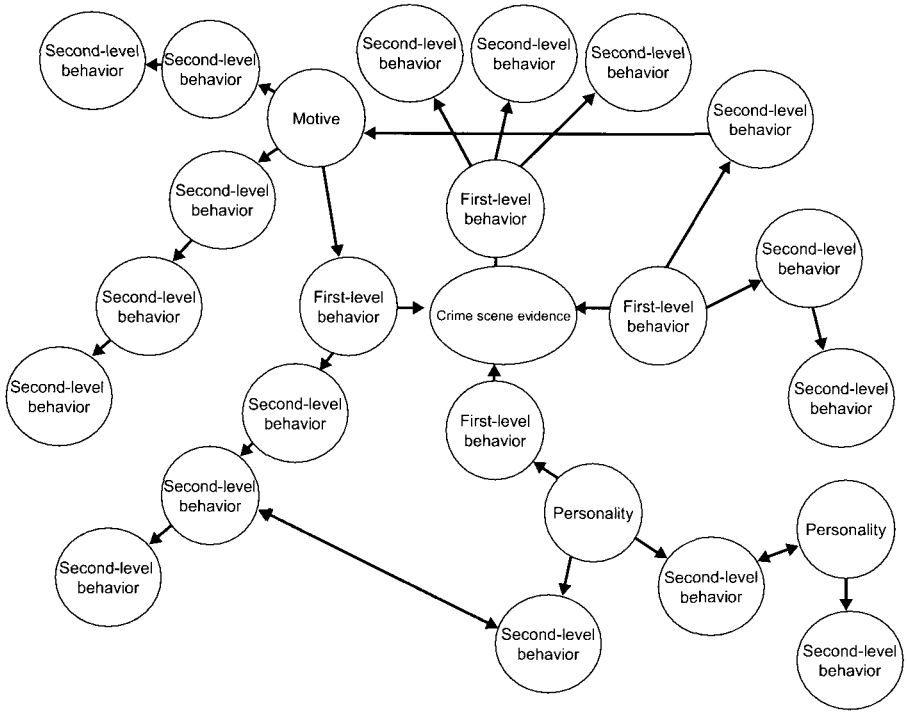

Figure 11.3. A more complex structure for a scientific model of profiling.

which relationships among variables continue to branch away from the crime-related behaviors, with each branch terminating in a second-level behavior.

The hypothetical scenario represented in Figures 11.3 and 11.4 is a home burglary. The resident comes home from work at lunchtime and discovers the house in disarray. Valuables have been taken, and when the police arrive they find no fingerprints at any point of entry to the house. As with Figures 11.1 and 11.2, Tier 1 comprises the crime scene evidence at the center of the figure and the first-level behaviors (striking during the day, vandalizing the home, taking valuables, and wearing gloves) that directly predict the evidence. In Tier 2, aspects of motive and personality predict the crime-related first-level behaviors. For example, the motive for financial gain predicts the stealing of valuables; likewise, the presence of hostility in the offender's personality predicts the vandalizing of the house. In Tier 3, motive, personality, and first-level offender behaviors predict second-level offender behaviors. For example, the same motive for financial gain that predicts the stealing of valuables also predicts that the offender has not secured gainful employment or that he has a drug problem that causes him

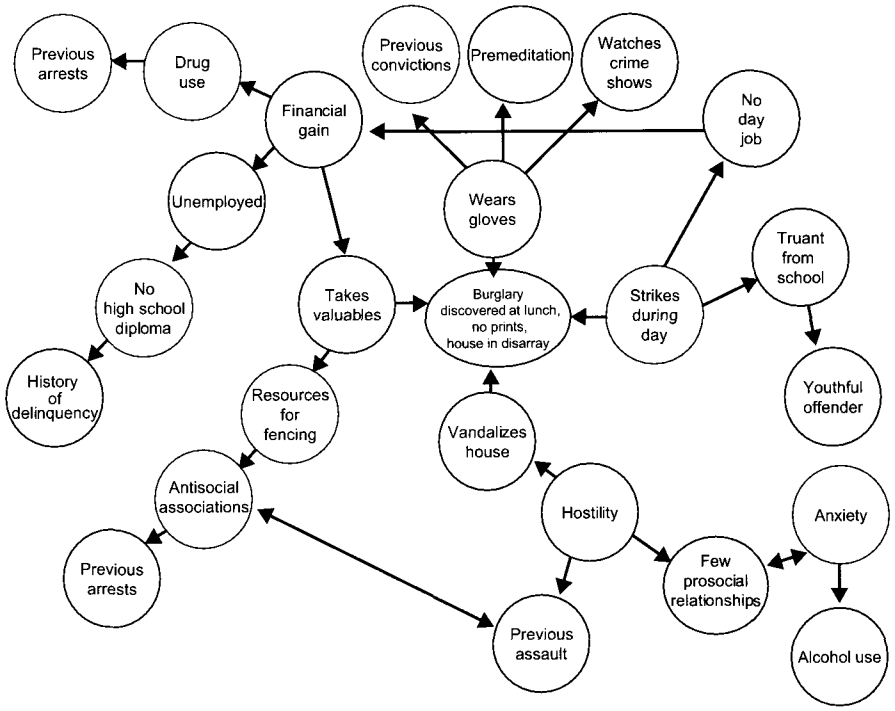

Figure 11.4. An illustration of the application of Figure 11.3.

to spend money beyond his means. Likewise, the same hostility that predicts the vandalizing of the house also predicts that the offender has engaged in previous assaultive behavior and has formed few prosocial relationships. In addition, the first-level offender behavior of striking during the day predicts that the offender is not employed during the day, or, if enrolled in school, is truant.

These types of relationships in Tiers 1, 2, and 3 depicted in Figures 11.3 and 11.4 are similar to the relationships described in the previous section and represented by Figures 11.1 and 11.2. However, in Figures 11.3 and 11.4 the branches of relationships beyond Tier 3 continue to predict second-level offender behaviors. In some cases, these behaviors are predicted directly from the second-level behaviors in Tier 3. For example, the first-level behavior of taking valuables predicts the second-level behavior of securing resources for fencing those valuables. That behavior in turn predicts that the offender will have formed antisocial associations, which in turn predicts that he is likely to have had previous contact with law enforcement, in the form of prior arrests. In other cases, the second-level behaviors in Tier 3 may predict aspects of motive and personality, which in turn predict

other second-level behaviors. For example, the second-level offender behavior of engaging in few prosocial relationships predicts (and is predicted by) anxiety, which in turn predicts alcohol consumption. Thus, second-level behaviors may continue to branch from other behaviors and from aspects of motive and personality.

The model of profiling just described requires scientific findings to link the variables of motive, personality, and behavior and generate predictions about offenders. Although the network of predictions and variables contained therein may therefore strike law enforcement investigators and profiling practitioners as an exclusively empirical exercise, the goal of this model is to identify offender behaviors that have relevance to investigations and that will assist law enforcement in identifying the correct perpetrator. Thus, each branch of the model terminates in a second-level behavior, describing a piece of information that law enforcement can use in an investigation. Science is required because the utility of the model for investigators depends in great part on the number and strength of the predictions that can be made to link aspects of motive, personality, and behavior together. The greater the evidence, and the more reliable and valid predictions that science can provide, the more that the model of any given crime example will branch. Because each branch terminates in a second-level behavior, and because the second-level behaviors are the behaviors most relevant to investigation, additional branches of predictions will increase the number of behaviors available for investigators to use in narrowing down the field of potential suspects in a crime.

LITERATURE INTEGRATING CRIME SCENE EVIDENCE, MOTIVES, PERSONALITY, AND BEHAVIOR

Although chapters 9 and 10 already discussed the state of the literature linking pairs of variables (e.g., motive and behavior) from the scientific profiling model, it would also be useful, and consistent with the concept of the model presented in this chapter, to consider any available literature that integrates all three of these variables (motive, personality, and behavior) in research on offending. Such literature would provide some clues as to how to further refine the scientific profiling model, by identifying the types of interrelationships among variables that have already been established. For example, literature that integrates these variables might be able to demonstrate how psychopathy (personality) and greed (motive) might act in concert to predict both violence toward a bank teller during a robbery (first-level behavior) and a parasitic living situation with a family member (second-level behavior). It is unfortunate that there is a paucity of research that approaches profiling by integrating variables of motive, personality,

and behavior in the manner described by the previous model. Research in the offender literature has failed to describe how motive, personality, and behavior work together in crime, and there are currently no reliable and valid findings that would allow investigators to use information about motive, personality, and first-level offender behaviors to make inferences about the types of second-level behaviors that might lead to the apprehension of a perpetrator.

One exception to this deficit in the offender literature is the homicide research conducted by Canter and his colleagues (e.g., Santilla et al., 2001). Canter's studies, although not entirely consistent with the previously described model of profiling, provide some clues about the types of predictions that might result from a simultaneous consideration of motive, personality, and behavior.

Multidimensional Scaling and Geographic Profiling Research

Research conducted by Canter and colleagues has attempted to address the offender characteristics of motive, personality, and behavior in combination and to use the findings to make investigation-relevant predictions. Some of these studies were reviewed in chapter 9 to illustrate findings relevant to motive (e.g., Canter & Fritzon, 1998; Fritzon, 2001), and Canter's work was discussed in greater detail in chapters 4 and 5. The following section reviews the multidimensional scaling and geographic profiling research on homicide offenders conducted by Canter and colleagues, to describe the available research combining aspects of motive, personality, and behavior (Canter, Coffey, Huntley, & Missen, 2000; Godwin & Canter, 1997; Salfati & Canter, 1999; Santilla, Hakkanen, Canter, & Elfgren, 2003) and to compare it with the previously described scientific model of profiling.

Multidimensional Scaling Research

There are two main studies that have used multidimensional scaling to simultaneously study homicide behaviors, aspects of motive and personality, and offender behaviors that might lead to the identification and apprehension of the perpetrator (for a more detailed description of Canter's methods, see chaps. 4 and 5). Salfati and Canter (1999) plotted 36 crime behaviors from 82 single-offender, single-victim homicides in a two-dimensional space using smallest space analysis (SSA), and the resulting scatter plot is divided into three sections according to the authors' theoretical determinations about motive themes, also called *interpersonal narratives*. The three themes of crime scene behaviors identified are Instrumental Opportunistic, Instrumental Cognitive, and Expressive Impulsive. The authors then attempted to link offender background characteristics to the

TABLE 11.1
Offender Themes, Crime Actions, and Offender Characteristics

Offender themes	Crime actions	Offender characteristics
Expressive (Impulsive)	Multiple wounds distributed across victim's body: limbs, torso, face Different types of wounds: slash/cut, stab Bring weapon to scene Use weapon from scene	Previous violent offenses Previous offenses for public disorder Previous offenses for damage to property Previous sexual offenses Previous traffic offenses Previous drug offenses Married at time of offense Previous marriage Female offender
Instrumental (Opportunistic)	Female victim Old victim Property of value taken Crime at victim's premises Manual infliction of injury Face hidden Sexual assault Partially undressed Neck injuries	Previous offenses for theft Previous offenses for burglary Previous vehical theft offenses Previously came to police notice Unemployed Familiar with the area of the crime Knew victim
Instrumental (Cognitive)	Body hidden Crime committed/body disposed outside Body left face up Transported body Stealing nonidentifiable property Removal of forensic evidence	Served in the armed services Served a prison sentence

Note. From "Differentiating Stranger Murders: Profiling Offender Characteristics From Behavioral Styles," by C. G. Salfati and D. V. Canter, 1999, *Journal of Behavioral Sciences and the Law, 17*, p. 404. Copyright 1999 by John Wiley and Sons, Ltd. Adapted with permission.

crime scene themes by conducting a second analysis that included 18 offender background variables in the SSA of the 36 crime scene actions. The resulting scatter plot is divided into the three offender themes just identified, and associations between crime scene actions and offender characteristics are asserted on the basis of their mutual presence in the same theme section of the scatter plot.

The three offender themes identified in this study, and the crime scene actions and offender characteristics that are associated with each, are shown in Table 11.1. According to Salfati and Canter (1999), the Expressive Impulsive theme represents a "collection of frenzied and eclectic impulsive behaviors" (p. 401). Examples of crime actions contained in this theme are multiple and varied types of wounds inflicted on the victim and the use of

a weapon. The associated offender characteristics include a history of a variety of violent and nonviolent offenses, marriage or a previous marriage, and being female. The Instrumental Opportunistic theme is "a distinct theme of opportunistic victims being targeted . . . where the offender used the victim as an object through which to attain an ulterior motive such as money or sex" (Salfati & Canter, 1999, p. 401). The crime actions found in this theme include the targeting of older female victims, committing the crime at the victim's home and taking property, committing sexual assault, and manually inflicting injury through methods such as strangulation. Associated offender characteristics include being familiar with the victim and the area, being unemployed, and having a previous history of burglary and theft. Finally, the Instrumental Cognitive theme has "a highly cognitive emphasis" (Salfati & Canter, 1999, p. 401), and offenders in this category attempt to hide their actions and remove incriminating evidence. Examples of crime actions include transporting and concealing the body, removing forensic evidence, and committing the murder or disposing of the body outdoors. Offenders in this theme have a history of having been in prison or the armed forces.

In a similar study, Santilla, Hakkanen, Canter, and Elfgren (2003) identified three themes of offender characteristics and one core set of offender characteristics in a set of 502 homicides, using SSA (see Table 11.2). The core set of offender characteristics are those that are common to a majority of the sample of homicides, in this case, greater than 50%. The variables in this core set of offender characteristics include being male and being familiar with the victim and with the area in which the crime was committed. These characteristics represent those that are thought to typify homicide offenders rather than distinguish among them. The three offender themes in the sample are Instrumental, Expressive (Intimate), and Expressive (Blood). According to the authors, the Instrumental theme describes "a maladjusted, antisocial lifestyle in conditions of relative social deprivation" (Santilla et al., 2003, p. 112). Associated offender characteristics include previous violent, property, and sexual offenses; being homeless or residing in government housing; and being single and abusing alcohol. The Expressive theme represents "relationship issues concerning both intimate and family relationships and problems in them" (Santilla et al., 2003, p. 113). The Expressive theme is divided according to whether the relationship between offender and victim is intimate or familial. The Expressive (Intimate) theme describes offenders who are "reacting against perceived frustration and threats to self-esteem" (Santilla et al., 2003, p. 114). Examples of offender characteristics in this theme include having an intimate relationship with the victim, being gainfully employed, owning a home, and having a weapon permit. In contrast, the Expressive (Blood) theme represents offenders who "are likely to have some sort of psychiatric problem . . .

TABLE 11.2
Offender Themes and Offender Characteristics

Offender theme	Offender characteristics
Core variables	Male Familiar with area Knew victim
Instrumental	Divorced Multiple convictions for violence Homeless Council housing Previous property offense conviction No weapon permit for gun used in homicide Previous sexual offense conviction Alcoholism Single
Expressive (Intimate)	Weapon permit for gun used in homicide Owns own home Intimate relationship with victim Higher level occupation (professional/entrepreneur)
Expressive (Blood)	Blood relative of victim Education beyond middle school Psychiatric problems

Note. From "Classifying Homicide Offenders and Predicting Their Characteristics From Crime Scene Behavior," by P. Santilla, H. Hakkanen, D. Canter, and T. Elfgren, 2003, *Scandinavian Journal of Psychology, 44,* pp. 107–118. Copyright 2003 by Blackwell Publishing. Adapted with permission.

[and] problems in creating or maintaining long-term relationships" (Santilla et al., 2003, p. 113). Offenders in this theme tend to be educated beyond middle school, be related to the victim by blood, and have a history of psychiatric problems.

To relate crime scene actions to offender characteristics, Santilla, Hakkanen, Canter, and Elfgren (2003) correlated the themes of the crime scene actions from the set of homicides (derived by Santilla, Canter, Elfgren, & Hakkanen, 2001) to the themes of offender characteristics. Across crime scene actions and offender characteristics, these themes are not identical. Whereas the offender characteristics comprise the three themes just described, the crime scene actions consist of five themes: Instrumental/Sex, Instrumental/Resources, Expressive/Firearm, Expressive/Body Parts Removed, and Expressive/Body Hidden. Correlational analyses between themes revealed that, "generally speaking, instrumental crime scene themes were associated with instrumental background characteristics and expressive crime scene themes were associated with expressive background characteristics" (Santilla, Hakkanen, Canter, & Elfgren, 2003, p. 117), with significant correlations ranging from .08 (Expressive/Body Hidden × Expressive/

Intimate) to .28 (Instrumental/Resources × Expressive/Intimate, for victims over age 56).

The two studies described previously (Salfati & Canter [1999], and Santilla, Hakkanen, Canter, & Elfgren [2003]) attempted to make predictions about offender background characteristics on the basis of crime scene actions through offender themes. Although the techniques used to associate offender characteristics and crime scene actions differ slightly, in both cases the relationship of offender themes to both offender characteristics and crime scene actions appears to be paramount. Findings from both studies suggest that determinations about interpersonal-narratives themes, namely, differences between expressive and instrumental motivations, can be used to relate crime scene actions to the kinds of offender background characteristics that may help identify the perpetrator.

Geographic Profiling

A second group of homicide studies conducted by Canter and colleagues involves geographic profiling. Although geographic profiling was briefly mentioned in the discussion of Holmes and Holmes's (1996) model in chapter 2, and mentioned in the discussion of the Canter model in chapters 4 and 5, much of this discussion was confined to Holmes and Holmes's (1996) limited description of a technique first articulated by Rossmo (1995a, 1995b, 1997). According to Rossmo, geographic profiling is a procedure that examines the spatial behavior of offenders with regard to the locations of their crime scenes and the spatial relationships between those scenes. Although geographic profiling involves quantitative measures that allow for the interpretation of spatial patterns, Rossmo (1997) also emphasized a subjective component involving the psychological profiling of the offender to reconstruct and interpret his "mental map" (p. 161). Rossmo did not describe procedures for this profiling component; neither did he specify how it interacts with the quantitative analyses of location patterns (Rossmo, 1997).

Geographic profiling, according to Rossmo's (1997) model, is based on a model of crime location selection put forth by Brantingham and Brantingham (1981). This model proposes that victim selection is spatially biased toward an offender's home location. As a result, criminal acts follow a decay function, such that the farther an offender is from home, the less likely he is to commit a crime. The model also articulates, however, that there is a buffer zone, such that offenders will avoid committing crimes too close to their homes, to avoid incriminating themselves. Rossmo's model integrates these two principles into a mathematical model, using the locations where a serial killer dumps his victims' bodies to identify the location of the

offender's home. Although Rossmo has described the utility of his technique, he has not specified the details of his algorithms, and there is currently no research demonstrating the validity of his model.

Unlike Rossmo's (1997) approach, which considers spatial behavior to be the product of some unspecified set of offender characteristics, Canter and colleagues have attempted to incorporate aspects of motive and personality in their concept of offenders' spatial behavior. These aspects of motive and personality are embedded in Canter's interpersonal-narratives theory and explain the principles that underlie offenders' choices regarding crime and home locations. Using SSA, Godwin and Canter (1997) attempted to model the spatial behavior of serial killers without the incorporation of the subjective profiling techniques advocated by Rossmo. The authors used SSA to plot two types of crime locations: the "point of fatal encounter" (Godwin & Canter, 1997, p. 27), where offenders apprehend their victims, and the locations where the offenders dump the victims' bodies. Using solved cases in which the offender's home location is known, the authors then attempted, on the basis of Canter's interpersonal-narratives theory, to assess the relationship between the crime locations and the offender's home. Recall that the main tenet of this theory is that crime is a product of the more general lifestyle of the offender. As applied to spatial behavior, this theory proposes that the home "acts as a structuring device for the development of criminal activity" (Godwin & Canter, 1997, p. 26). Thus, according to Canter, if crime develops out of an offender's daily activities, then the home location will also necessarily be central to his offenses. The predictions generated from this model of geographic profiling are somewhat consistent with the distance-decay and buffer principles that guide Rossmo's (1997) model, but there are also some differences. First, Godwin and Canter (1997) predicted that the home will operate as a base for the activities of the offender. This prediction is similar to the distance-decay hypothesis in the Rossmo model, which suggests that an offender's crimes will radiate out from the central home base. Second, Godwin and Canter predicted that there will be differences in the distances traveled to acquire victims and dump their bodies. They suggested that the body dump location is likely to contain the most forensic evidence and is therefore likely to be farther from the offender's home. This prediction incorporates the buffer principle from the Rossmo model but applies it only to the body dump location. Third, they predicted that the body dump locations will change over time, whereas the points of fatal encounter will not. This prediction is consistent with interpersonal-narratives theory, which suggests that acquiring victims will be an outgrowth of the offender's daily activities, whereas the body dump locations will change so that the offender can avoid incrimination.

Godwin and Canter's (1997) results indicate that offenders indeed tend to operate from a home base and acquire their victims closer to home

than the locations where they dump their victims' bodies. Over 10 offenses, the mean distance from offenders' homes to the point of fatal encounter in a sample of 54 serial offenders was 1.46 miles, whereas the average distance to the body dump location was 14.3 miles (Godwin & Canter, 1997). Contrary to what was predicted, however, the body dump locations became progressively closer to offenders' homes over the course of 10 offenses, rather than gradually being farther away. The authors proposed that this finding suggests that the offenses became increasingly integrated into the offenders' daily lives, but they admitted that future research is necessary to clearly identify the factors involved.

Subsequent studies have supported Godwin and Canter's (1997) findings and have demonstrated success at modeling offenders' home locations on the basis of information about the locations of their crimes. A study of 126 U.S. and 29 British serial killers (Lundrigan & Canter, 2001) used the circle hypothesis (Canter & Larkin, 1993) to correctly predict that serial killers' home locations can be found within a circle defined by the two disposal sites that are farthest from each other. Using this heuristic, 89% of U.S. serial killers' homes and 86% of the British serial killers' homes were found to be contained within the identified circles. In addition, the location of the home was not necessarily in the center of the circle, which would indicate random movement in a variety of directions to commit crimes; instead, the relationship between home and crime locations was biased along routes that were related to other activities in the offender's life (e.g., work).

Other studies have used a geographical decision support tool based on the principles of spatial behavior articulated in Canter's geographic profiling model to model offenders' home locations from the locations of body disposals. This decision support tool (Dragnet) was used on a sample of 79 U.S. serial killers (Canter et al., 2000) to assess the cost-effectiveness of various search area sizes. The offenders' home addresses as well as the addresses of body dump locations were entered into the computerized tool as raw coordinates. All 79 of the serial killers' home addresses were located within the search parameters defined by Dragnet for the sample of offenses. In terms of cost-effectiveness, 51% of offenders' homes were found within the first 5% of rank-ordered locations specified by Dragnet, and 87% of homes were found within the first 25% of locations, placing the optimal search cost of the entire sample at 11% of the defined search area. A subsequent study demonstrated that, given two relevant heuristics (the circle hypothesis and the distance-decay principle), study participants with no knowledge of geographic profiling achieved predictions of offender home locations that were not significantly different from those generated by Dragnet (Snook, Canter, & Bennell, 2002). Thus, it appears that although Dragnet can generate efficient predictions about offender home locations from information

about body dump sites, human judges can, with minimal training, achieve comparable success by eyeballing data plots of body dump locations.

Evaluation of the Research by Canter and Colleagues and Its Relationship to a Scientific Model of Profiling

The research conducted by Canter and colleagues constitutes perhaps the only body of literature to simultaneously address offender motives, personality, and behavior and to attempt to describe the interrelationships among these variables. The homicide studies described in the previous section represent two areas of research—multidimensional scaling of offender characteristics and geographic profiling—that have generated relationships between crime actions and offender characteristics that may be of use to investigations.

There are three basic types of variables in the multidimensional scaling research: crime scene actions, offender themes, and offender background characteristics. A comparison between these components of the multidimensional scaling research and the components of a scientific model of profiling described earlier in this chapter reveals several similarities between the basic variables involved.

First, the crime scene actions described in the studies of Canter and colleagues appear to represent a combination of crime scene evidence and first-level offender behaviors as described by the current model. For example, the presence of neck injuries (Salfati & Canter, 1999) is more consistent with crime scene evidence, whereas the variable indicating manual infliction of injury appears to represent a first-level, crime-related offender behavior that might predict the presence of neck injuries. Canter and colleagues have not addressed the distinction between crime scene evidence and the behaviors that would be discerned from that evidence using crime reconstruction. Instead, using police files from solved cases, they extracted crime-relevant variables that seem to contain both pieces of evidence and crime behaviors. In the geographic profiling studies, the only crime scene actions focused on are the acquisition of the victim and the dumping of the body. Again, Canter and colleagues have not distinguished between the crime scene evidence (e.g., locations of point of fatal encounter and body dump) and the behaviors that predict the evidence (e.g., acquiring a victim and dumping the body); however, the crime scene actions in geographic profiling appear to be more analogous to first-level offender behaviors than to pieces of crime scene evidence because of the authors' emphasis on the locations as indicating a choice on the part of the offender.

Second, the offender themes, guided by interpersonal-narratives theory, appear to address aspects of motive and, to a lesser extent, personality, as a way of relating crime scene actions to offender background characteristics.

As discussed in chapter 9, the instrumental and expressive themes described by Canter and colleagues refer to offenders' motivations and purpose for committing crimes. The instrumental themes reflect the pursuit of some type of secondary gain, whereas the expressive themes seem to indicate a desire to release a certain degree of hostility or aggression. For example, Santilla, Hakkanen, Canter, and Elfgren (2003) described offenders in the Instrumental theme as using aggression as a problem-solving technique. Conversely, Salfati and Canter (1999) described the Expressive theme as evidencing a "very emotional attack" (p. 401). The presence of characteristics such as hostility and impulsivity in the descriptions of these themes also implies the influence of aspects of personality; however, this was not directly addressed by the authors.

In the geographic profiling studies, the role of interpersonal-narratives theory is much more embedded than in the homicide studies conducted by Salfati and Canter (1999) and Santilla, Hakkanen, Canter, and Elfgren (2003). Instead of dividing homicide offenders according to offender themes, the geographic profiling studies appear to consider the spatial patterns of offenders as deriving from a common theme, or motive. According to interpersonal-narratives theory, the motivation for offenders to commit crimes grows out of their daily activities. The motivation to acquire victims thus appears to reflect a certain degree of opportunism and, potentially, impulsivity, with the choice of body disposal site reflecting the motivation to avoid incrimination but still occurring within the area circumscribed by the repertoire of the offender's noncriminal activities.

Third, the offender background characteristics described by the multidimensional scaling studies appear to be analogous to second-level offender behaviors. Salfati and Canter (1999) described background characteristics such as offense histories, the use and abuse of alcohol and drugs, and being unemployed, whereas Santilla, Hakkanen, Canter, and Elfgren (2003) described such characteristics as involvement in relationships, educational achievement, and acquisition of weapon permits. These types of characteristics are similar to the types of second-level behaviors, described in Figures 11.1 through 11.4, that may assist in identifying and apprehending the perpetrator. The geographic profiling studies focus on a single second-level behavior: the offender's selection of a home location. As evidenced by studies of geographic profiling, home location may be one of the most efficient second-level behaviors currently available in terms of narrowing down the suspect pool. As further studies of geographic profiling are conducted, it may be possible to increase the accuracy and efficiency of home location for identifying the correct perpetrator.

Although the multidimensional scaling and geographic profiling research uses some of the same theoretical components as the model of profiling proposed in this chapter, its findings are limited with regard to informing

a science of profiling in two major ways. There are limitations related to the conceptual criticisms made of the Canter model, described more fully in chapter 5, such as inconsistencies in interpersonal-narratives theory and the consequent problems with the resulting hypotheses. Because the studies described previously derive from the Canter model and interpersonal-narratives theory, they necessarily lack a certain degree of conceptual clarity and scientific rigor, which makes it difficult to have unqualified confidence in the validity of the findings. In addition, although the difficulties with using multidimensional scaling techniques were already discussed in chapter 5, it bears repeating that SSA does not allow one to make causal predictions that link elements of motive and personality to either first- or second-level behaviors, represented in the Canter studies by offender themes, crime scene actions, and offender background characteristics, respectively. Instead, what SSA allows the Canter studies to demonstrate is the co-occurrence of certain first- and second-level behaviors in a section of a visual scatter plot whose properties have been defined by the theoretical proposals of the authors. Although the practice of identifying behaviors that co-occur is not without value to a scientific model of profiling, the determination of co-occurrence in SSA is, to a great extent, made subjectively by the authors. SSA may plot the relationships between variables, but it is the authors who determine the delineation between one group of variables and another. This is a significant limitation, because the use of subjective judgment is not scientific, and determinations made through subjective judgment therefore do not add to a science of profiling.

Considering both the limitations to the research conducted by Canter and colleagues and its conceptual similarities to the scientific model of profiling proposed in this chapter, there are three contributions that this body of literature can make to the advancement of a science of profiling. First, the studies by Canter and colleagues demonstrate that it is possible to incorporate motive, personality, and behavior into a single model of profiling and identify associations between first- and second-level offender behaviors. According to the Canter studies, this is accomplished through a consideration of offender themes, much in the same way that the model of profiling described in this chapter considers the roles of motive and personality in generating first- and second-level behaviors. From here, what is required for a scientific model is to re-examine these relationships as causal pathways and to attempt to measure the influence of motive and personality as latent variables rather than subjectively determining their relationship to behaviors. Second, as described in Table 11.1, the Canter research has identified certain co-occurrences of first- and second-level behaviors. Although the degree of association between these behaviors, and the nature of the variables linking them, has yet to be determined, as just described, it would seem reasonable to incorporate these co-occurrences

into a scientific model of profiling as hypotheses to be tested once the appropriate data sets are obtained. For example, Salfati and Canter (1999) reported the co-occurrence of removing forensic evidence (first-level behavior) and a history of being in prison (second-level behavior) within the same offender theme. With the appropriate data, one could test whether there is a predictive relationship between these two variables, such that the absence of evidence such as fingerprints and DNA indicates that the offender has spent time in prison, a hypothesis for which there is already some support (Davies, Wittebrood, & Jackson, 1997). Third, the geographic profiling research conducted by Canter and colleagues provides a seemingly robust predictive relationship between homicide locations (first-level behavior) and offender home locations (second-level behavior). Although this relationship is valuable as a heuristic, it is also consistent with the scientific model of profiling described in this chapter. Homicide locations and home locations, as first- and second-level behaviors, are potentially linked by aspects of motive and personality. On the basis of the findings of Canter and colleagues (e.g., Snook, Canter, & Bennell, 2002), these aspects of motive and personality may relate to comfort in familiar areas (e.g., obtaining victims near the home location) as well as the motivation to avoid apprehension (e.g., disposing of bodies farther from home). Further empirical testing of the relationships between spatial behavior and aspects of motive and personality may greatly enhance a scientific model of profiling as well as its consequent investigative inferences.

Because of the limitations described here and in chapter 5, it does not appear that the research of Canter and colleagues can supplant the scientific model of profiling proposed in this chapter. There appears to be considerable agreement, however, between the two approaches in terms of identifying important components or variables and attempting to relate them to each other. Although the more subjective elements of the Canter model and its related studies are problematic for reasons already detailed, there is still a contribution to be made by the research of Canter and colleagues to a science of profiling. Specifically, their findings have provided some promising directions for the testing of hypotheses linking aspects of motive and personality to both first- and second-level behaviors, and the studies on geographic profiling have been quite convincing with regard to the potential for using spatial (first-level) behavior to predict offender home location (second-level behavior).

ROLE OF SITUATIONAL FACTORS

There remains one type of variable to consider in a scientific model of profiling that has, thus far, not been explicitly accounted for by the tenets

or analyses of any other model of profiling: situational factors. A scientific model of profiling is ultimately concerned with predicting offender behavior. The purpose of profiling as a practice is to attempt to ascertain crime events (first-level offender behaviors) and use that information to make predictions about the offender (second-level behaviors) that will allow law enforcement to identify and apprehend him. A scientific model of profiling proposes that motive and personality (and their expression as behavior) are the important variables that can be used to assist in making these predictions. As articulated by Alison, Bennell, and Mokros (2002), however, and as discussed in chapter 10, there are indications in the personality literature that various environmental and situational conditions affect the expression of personality characteristics. Similarly, the model of motive described in chapter 8 indicates that there is every reason to predict that motive is also susceptible to situational influence. Thus, the variables important to predicting offender behavior do not exist in a vacuum but instead change with context. A complete understanding of a science of profiling therefore requires a consideration of that context.

Addressing the role of situational factors within a scientific model of profiling requires two trajectories of scholarship. As touched on in previous discussions of motive and personality, more research must examine the influence of situational factors on motive and personality characteristics themselves, to identify any consistent patterns that might be of assistance to investigative practice. While such research is underway, a scientific model of profiling also must consider how the construct of situational factors might operate in offending and how that construct might be related to variables of motive, personality, and behavior.

To successfully carry out these two types of scholarship, researchers must first address two considerations. First, what are situational factors? Second, how do they come into play during the course of an offense? In the current scientific model of profiling, it is proposed that situational factors are elements related to the context or environment of the offense. They can include such components as location, time, weather, victim response, and unexpected obstacles to the completion of an offense. Situational factors can also include some types of events that are internal to the offender (e.g., the sudden onset of a migraine). These types of offender states must be specific to the context of the crime to be situational factors rather than long-standing internal traits. Situational factors are not offender motives, personality characteristics, or behaviors.

In a scientific model of profiling, situational factors are identified and described through crime reconstruction. To the extent that crime scene evidence permits the logical reconstruction of crime events and their temporal order, situational factors will also be derived from this crime scene

evidence and included in the timeline and narrative. For example, a crime location can be reconstructed with a physical description of the crime scene. The time of a crime can be determined by such pieces of evidence as estimated time of death, the state (lit or extinguished) of broken lights, victim and witness statements, and alibi information from suspects. A sudden downpour of rain may be ascertained by observing wet objects outside the crime scene, water damage, and cross-references with weather reports. Unexpected reactions from victims may be evidenced by victim and witness statements, evidence of escalation in violence, or the failure to complete an offense. An unexpected obstacle, such as a large animal darting out in front of a getaway car, may be evidenced by skid marks on the road or the presence of animal remains on the vehicle. Whatever the scenario, a situational factor is simply another element of the crime event that can be reconstructed from the crime scene evidence. As such, the description of situational factors is included within the narrative and timeline of a crime reconstruction.

The second important consideration is that although situational factors do not fall under the rubric of offender characteristics, they do interact with offender motive and personality characteristics in the manifestation of first-level offender behaviors. Although the possible range of situational influences in offending may seem limitless, it is in fact possible to account for situational influences within this current scientific model of profiling if these situations are considered from the perspective of their relationship to offender motive, personality, and behavior rather than being considered as individual scenarios.

For example, consider the narrative of the scenario depicted in Figure 11.2. In this crime scenario, an unpleasant situational factor is presented to the offender, such that the victim resists the offender's initial attempts to rob her. The model indicates that the presence of hostility as a personality variable, together with the motive to force the victim to comply, results in a violent response from the offender. Now consider how the offender's response might differ depending on the manner in which the victim resists. If the victim resists aggressively, by hitting or kicking the offender, screaming, or threatening to call the police, the offender's response might be expected to be very similar to the scenario in Figure 11.2. However, if the victim resists more passively, by holding on to her belongings, crying, and turning away from the offender, he might be less inclined to respond violently. Thus, the specific situation of victim resistance appears to be less important than the impact that the resistance has on the offender. In the first version of victim resistance, the offender might feel challenged or threatened. The violence would therefore be a response to feeling threatened, taking into account the motive, personality, and behavioral variables already in place.

In the second scenario, the offender might feel less challenged by the victim and might therefore not feel inclined to use as much force as he would use with a more aggressive victim.

If one considers other situational factors that might influence offender behavior, it becomes equally apparent that the details of any given situation are less relevant than the impact of the situation on the offender. For example, what is the value of rain as a situational factor unless one knows the impact of rain on the offender? Will an offender feel frustrated and angry if it begins to rain during the commission of an arson? Or will the offender simply walk away and decide to come back another time? Could rain be perceived as beneficial to other types of offenders who want evidence to be washed away? The presence of rain itself carries no inherent meaning. Instead, it is the offender's perception of rain that has an influence on his subsequent actions.

In addition, however, the offender's perception is not the sole influence on his subsequent actions. Rather, the situation and the offender's perception of that situation interact with existing motive and personality variables to produce first-level behaviors. For example, if an offender were hostile and motivated to set a fire for revenge, he might respond differently to bad weather than would a more passive offender who was motivated by boredom.

Recall that in proposing ways to study a situation-specific model of personality, Alison et al. (2002) suggested developing if–then contingencies through interviews with offenders to identify common sets of relationships between situations and personality characteristics (e.g., "When a victim resists me, I become hostile"). As described in chapter 10, the development of these if–then contingencies is a strategy that may assist in the consideration of situational factors in assessing offender personality. However, if one further considers that offenders respond not to individual situations but that, instead, the impact of situations influences offending behavior, finding categories of if–then contingencies for situations and personality, as well as motive and behavior, becomes a much more manageable task. In this framework, the task is not to find contingencies between, for example, the presence of rain and some aspect of offender personality, because rain can make some offenders happy and others frustrated, and because a wide variety of other weather conditions can make offenders happy or frustrated. Instead, the task is to use the crime reconstruction to ascertain the impact of the situational factor on the offender and relate that impact to motive, personality, and first-level behaviors. A science of profiling is concerned not with whether it rained during the course of an offender's crime but with how the rain, snow, a resistant victim, or a malfunctioning gun affected the offender and how that relates to his motive, personality, and behavior.