Criminal Psychological Profiling of Serial Arson Crimes

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Abstract: *The practice of criminal psychological profiling is frequently cited as being applicable to serial arson crimes. Despite this claim, there does not appear to be any empirical research that examines serial arson offence behaviors in the context of profiling. This study seeks to develop an empirical model of serial arsonist behaviors that can be systematically associated with probable offender characteristics. Analysis has produced a model of offence behaviors that identify four discrete behavior patterns, all of which share a constellation of common nondiscriminatory behaviors. The inherent behavioral themes of each of these patterns are explored with discussion of their broader implications for our understanding of serial arson and directions for future research.*

Criminal psychological profiling is the forensic technique of analyzing crime behaviors to construct a descriptive template of probable offenders (Wilson, Lincoln, & Kocsis, 1997). The practice of and research into profiling has predominantly been focussed on crimes of sexual violence such as murder and rape. Although comparatively little research has actually been developed, profiling is nonetheless frequently cited as also being applicable to the investigation of arson crimes (Holmes & Holmes, 1996; Rossmo, 1997; Vorpagel, 1982). Despite this reputation and acceptance of profiling by the law enforcement community, there exists a surprising dearth of rigorous empirical research on the topic of profiling (Kocsis, in press; Kocsis, Hayes & Irwin, 2002; Kocsis, Irwin, Hayes, & Nunn, 2000; Oleson, 1996). The objective of this study is to develop an empirical model for the criminal psychological profiling of serial arson offences.

The majority of current social science research on arson is dominated by psychiatric or psychological studies that examine issues of mental status and/or offender etiology (e.g., Barnett & Spitzer, 1994; Geller, 1992; Harris & Rice, 1996; Lewis & Yarnell, 1952; Rix, 1994), or criminological studies that propose either varying motive-based classification taxonomies (Bennett & Hess, 1984; Prins, Tennent, & Trick, 1985) or anecdotal case studies (e.g., Jeffers, 1992; Orr, 1989a, 1989b). Despite this body of literature on the broad topic of arson, little empirical material actually exists on the psychological profiling of arson crimes

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for criminal investigations and little, if any, exists on the specific topic of profiling serial arsonists.

Possibly the first and largest body of research to examine arson for the specific purpose of criminal psychological profiling was undertaken by the Behavioral Science Unit of the American FBI (Icove & Estepp, 1987; Rider, 1980a, 1980b). The central theme of this research program was the development of various motive categories correlated with crime behaviors and typical offender characteristics. These studies culminated in the proposal of six broad motive categories for arson (Douglas, Burgess, Burgess, & Ressler, 1992).

The first category identified was labeled *vandalism* and is described as being motivated by wanton destruction. Offenders are typically juveniles, and their crimes demonstrate little sophistication. The second category of excitement deals with motives of psychological stimulation and includes crimes committed for histrionic or heroic desires, to satisfy sexual fetishes, or owing to psychotic delusion. Offenders in this category tend to be older, and such crimes are typically characterized by perpetrators remaining at crime scenes, engaging in masturbation, and igniting low-risk targets such as dumpsters and vegetation. The third category of profit deals with arsons motivated by some material gain and frequently involves fraudulent insurance claims by the offenders and/or victims. As the title implies, the fourth category of revenge is committed "in retaliation for some injustice, real or imagined, perceived by the offender" (Douglas et al., 1992, p. 173). A prior relationship between victims and offenders typically characterizes these offences, and there is often evidence of premeditation and planning combined with the use of accelerants. Offenders are typically adult men in blue-collar jobs. The fifth category of crime concealment identifies arson as a means of concealing the evidence of another crime. The sixth and final category, termed *extremist*, refers to fires that are set to further some social, political, or religious objectives.

Perhaps the first study to advance any theory-driven development of profiling techniques for arson was undertaken by Kocsis, Irwin, and Hayes (1998). This study examined the organized-disorganized behavior dichotomy developed by the FBI Behavioral Science Unit for sexual murderers within the context of arsonists. The underlying premise of this dichotomy was the interpretation of sexual murder crime scenes by their level of behavioral sophistication and the matching of offender characteristics. The organized category describes a methodical, premeditated crime with offender characteristics such as maturity, resourcefulness, and typically, sexual perversion being exhibited. Conversely, the disorganized category represents a haphazard, almost random crime with offender characteristics such as immaturity, opportunism, and a likelihood of some form of mental disorder being demonstrated (Ressler, Burgess, & Douglas, 1988).

Although the organized-disorganized typology was developed from a study of sexual murderers, its generalization to arson profiling is evident in the exposition offered by Douglas et al. (1992). The absence of any empirically derived data to support this generalization prompted the study by Kocsis et al. (1998). Within the confined parameters of two forms of arson offences, this study was able to repli-

cate the dichotomous distinction of the organized-disorganized typology. The results of this study found that such a simple dichotomy could not validly be supported when applied to the full gamut of possible behaviors and motivations involved in arson offences.

A key factor of previous profiling studies, such as that of Douglas et al. (1992), has been the combination of inferred motivations with identifiable behaviors for the construction of proposed typologies. However, as Canter and Heritage (1989) indicated, the basic tenet of profiling is that offenders differ in their actions and that these differences in behavior relate to offenders' characteristics. Thus, the interpretation of crime actions requires the classification of offence behaviors as distinct from any inferred motivations. Consequently, the majority of studies used for profiling that combine the inference of motivations with observable behaviors are arguably empirically flawed (Godwin, 2000; Kocsis, 1999; Kocsis, Cooksey, & Irwin, 2002; Kocsis, Irwin, & Cooksey, 2002).

The only previous study thus far to address this methodological issue within the context of arson profiling was that of Canter and Fritzon (1998). This study identified four basic patterns to arsonist crime scene behavior. The first pattern, labeled *instrumental person*, is described as being the result of some form of dispute between offenders and victims and is reminiscent of a revenge-motivated scenario. Characteristics of this pattern include a pattern of threats and arguments between offenders and victims, premeditation in the commission of offences, and specific targets selected for attack. The second pattern, labeled *instrumental object*, is an opportunistic style of offence with no coherent purpose for the commission of crime. Behaviors characterizing this pattern include theft of property and fire occurring in an external, visible location, typically on a weekday. This pattern was found to be strongly associated with multiple juvenile offenders.

The third pattern, labeled *expressive person*, is characterized by some form of histrionic goal of offenders with fires being set to "alleviate distress by seeking attention" (Canter & Fritzon, 1998, p. 82). Characteristic behaviors in this pattern include the presence of suicide notes, with offenders frequently presenting as victims. The final pattern of expressive object is distinguished by multiple offences believed to be committed to achieve some form of emotional relief. Behaviors inherent to this pattern include multiple offences being perpetrated on hospitals, businesses, or public buildings, with offenders being triggered into offending by nonspecific events and remaining at crime scenes to observe the fires.

Although Canter and Fritzon (1998) made a definitive contribution to the development of arson profiling in general, a number of issues remain to fully inform our understanding of arson and serial arson profiling in particular. The specific topic of serial arson profiling has been the focus of little empirical research despite the additional difficulties such offences present to investigators. Indeed, the technique of profiling has often been found to be of far more utility in the investigation of recidivistic offences, as nonrecidivistic crimes can typically be solved via regular investigative procedures (Ainsworth, 2001; Geberth, 1996).

This issue in particular acts as a special impetus to warrant far more detailed scrutiny of serial arson crimes.

Irrespective of the crime modality, the majority of profiling studies fail to recognize and account for possible commonalties in criminal behavior. That is, previous studies typically employ categorical typologies that do not actually allow for the discrimination of a specific pattern of offence from behaviors that may simply be typical of the crime. In addition, these categorical constructs typically do not provide any impression of the overall relationship between the varying categories or any possible comorbidity of motives between patterns. These are important issues, as the actual practice of psychological profiling in criminal investigations does not adopt such static approaches. The published literature on which such practice is supposedly based does not concord with these rigid constructs (Britton, 1997; Dietz, 1985; Douglas, Ressler, Burgess, & Hartman, 1986).

In conclusion, this study seeks to develop an empirical model for the criminal psychological profiling of serial arson crimes by independently analyzing offence behaviors and thus avoiding the methodological pitfalls of previous studies. In addition, this analysis will also explore and attempt to identify the existence of common behaviors as distinct from those that can truly discern a specific pattern of behavior. Furthermore, the developed model will provide some understanding of the potential relationships between patterns. Finally, the sample for this study will specifically focus on serial or recidivistic arsonists that thus far have received surprisingly little examination in psychological profiling research.

METHOD

DATABASE AND DATA-SCREENING PROCESS

The database employed in this study consisted of 148 incidents of arson. The cases were obtained from the New South Wales and Victorian police jurisdictions, which represent the two largest police agencies in Australia. All cases featured a minimum of three arson offences and satisfied the criteria for serial violent offences as described by Kocsis and Irwin (1998). The cases dated as far back as 1980 and as recently as 1998. All offenders in the sample had been convicted and incarcerated for their offences. The variables for this study were extracted from those originally developed in Kocsis et al. (1998). These variables were screened and marked for retention in subsequent analysis if they demonstrated (a) sufficient nonmissing entries and (b) sufficient variability across categories within each variable. Frequency distributions were computed for all variables in the database. Extremely small variances (indicating a near constant) were deleted prior to analysis, as were variables having missing values in more than 50% of database cases.

CONDENSATION OF THE VARIABLES

To facilitate analysis and interpretation, conceptually similar categories for each variable were collapsed with a view to producing dichotomous (0, 1) measures having a reasonable number of Category 1 responses. Most variables were recoded on a presence-absence basis, whereas others were recoded into less or more categories. Some variables having multiple categories were dummy coded into several dichotomous variables (e.g., variables for arson target, distance offender traveled to target, point(s) of origin for the fire, and so forth). Variables with very few or no Category 1 responses remaining after this coding process were deleted from the database. Several variables were almost perfectly correlated with other related variables in the database, and to avoid problems with extreme multicollinearity, these redundant variables were also deleted from the analysis.

The data-screening and variable condensation process yielded a final set of 71 variables. For the major analyses, variables were broadly grouped into conceptual sets: offender personal characteristics (personal set containing 12 variables); general offender behaviour characteristics (general set containing 14 variables); arson event-specific offender behaviour and choice characteristics (event-specific set containing 16 variables, including 7 variables coding the time and season chosen for the arson event), and crime scene characteristics (crime scene set containing 29 variables, which included variables coding the target of the arson event). An appendix detailing these variables is attached.

ANALYTICAL PROCESS

The analysis proceeded in several discrete stages, commencing with a nonmetric multidimensional scaling (MDS) analysis of the 29 dichotomous variables in the crime scene set. This analysis was accomplished using the MDS program in SYSTAT 9.0. Guttman's coefficient of alienation minimization criterion was employed to control the scaling process, and Jaccard's measure of binary similarity was employed as the similarity measure (a process similar to that recently employed by Kocsis, Cooksey, & Irwin, 2002 and Kocsis, Irwin, & Cooksey, 2002). The two-dimensional MDS solution that emerged from this stage was retained for further analysis and interpretation. However, for purposes of MDS, 29 objects would be considered a sufficient sample for scaling (see Hair, Anderson, Tatham, & Black, 1998).

The second stage of analysis subjected the resulting MDS dimensional coordinates to cluster analysis to facilitate a regional interpretation of the dimensional solution (a process recommended by Coxon, 1982). Dissimilarity was measured using the squared Euclidean distance, and the clustering algorithm employed was Ward's minimum variance hierarchical method. The standardized dimensional coordinates of the MDS solution were then plotted on a scatterplot using different symbols to distinguish cluster groupings and facilitate identification of crime

scene attribute regions. The number of entities clustered in this analysis could be considered a sufficient sample of serial arsonists for the purposes of cluster analysis (see Hair et al., 1998).

The third stage of analysis focused on fitting external property vectors using variables from the personal, general, and event-specific variable sets to the MDS coordinates for each of the 29 variables in the crime scene set. This was accomplished by building up a new database containing the standardized coordinates for the two MDS dimensions and conditional probabilities for each dichotomous external property variable not contained in the crime scene set (i.e., those variables contained in the personal, general, and event-specific sets). For a combination of specific external property variable and crime scene characteristic, the mean for that external property variable within the category coded 1 for that specific crime scene characteristic was computed. This mean directly represented the conditional probability that the external property variable of interest (e.g., OLANG) equaled 1 (offender was bilingual or multilingual) when specific crime scene characteristics (e.g., TOCCUPY) also equaled 1 (target was occupied with people at the time of the arson). These conditional probabilities defined the external property vector variables statistically fitted to the MDS coordinates. It is important to acknowledge that the sample size for the conditional probability analysis conducted would be considered too small to cross-validate the resulting equation parameter estimates. However, as the purpose of this exercise was primarily descriptive and relational as opposed to establishing equations for predictive purposes, this sample was considered sufficient for the purpose of this article.

Property fitting was accomplished using an extension of the multiple regression procedure for fitting direction cosines described by Kruskal and Wish (1978) and implemented in the SYSTAT 9.0 using the vector method in the perceptual mapping procedure. (Essentially, the procedure was that each external property vector served as a dependent variable in a regression analysis where the two MDS coordinates served as predictors.) Screening for external property variables significantly predicted by the two-dimension MDS configuration of crime scene characteristics occurred on a variable-by-variable basis. The significance decision was based on the omnibus F test for the regression analysis of that variable; only those external property vectors that were predictable based on a criterion of $p < .05$ were retained for display and interpretation. The final significant external property vectors were displayed in sets by superimposing the fitted vectors (of standardized unit length) in a series of two-dimensional MDS scatterplots. The direction that each vector points is defined by the direction and magnitude of the standardized regression coefficient for each of the two MDS dimensions. The fitted vector thus indicates where the relevant external attributes will tend to reflect a code of 1 when the crime scene variables in that region of the MDS space also tend to reflect a code of 1 (i.e., the vector points to where the conditional probabilities are highest).
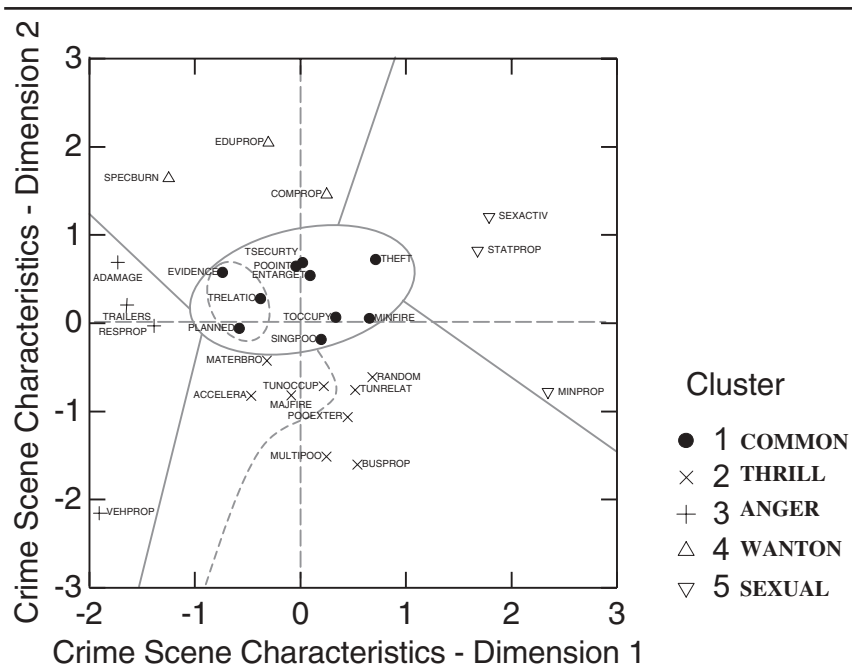
Figure 1   **Multidimensional Scaling of Crime Scene Variables in Two Dimensions With Regional Hierarchical Clustering of Scaling Coordinates Superimposed**

RESULTS

MDS

Each of the two- through five-dimensional MDS solutions was examined, and the two-dimensional solution was chosen as most interpretable (coefficient of alienation = .230; R^2 = .816). Higher dimensional solutions produced a marginally better fit to the data but at the cost of much greater interpretive complexity and increased noncomparability to previous research findings (e.g., Kocsis, Cooksey, & Irwin, 2002; Kocsis, Irwin, & Cooksey, 2002). Figure 1 shows the plot of the standardized coordinates for the two-dimensional MDS solution for the 29 variables in the crime scene set.

The two-dimensional MDS coordinates were hierarchically clustered, and five clusters (two of which had meaningful embedded subclusters) of crime scene variables were identified. These clusters divided the two-dimensional space of crime scene variables into five nonoverlapping regions and two subregions. The five clusters of coordinates are marked by distinct plotting symbols in Figure 1, and the cluster regions have also been sketched in; a dotted ellipse and region boundary denotes the meaningful subregion structure. Figure 1 could be inter-

preted in several ways, but a regional interpretation is the clearest way. Crime scene variables appearing in the same region of the plot were inspected for common themes to obtain an interpretation of what each region might be indicating.

The central Cluster 1 (surrounded by the solid-boundary ellipse) represented crime scene variables that were not clearly differentiated by the two-dimensional MDS structure—they were associated by virtue of having similar coordinate patterns centered on or near zero for each dimension. Consequently, this cluster was labeled the *common* behavior pattern. However, it is clear that within this central region, a substructure was identified by the cluster analysis, differentiated somewhat along MDS Dimension 1. The small dotted ellipse surrounds those crime scene variables, separating them from the remaining central variables. The pattern suggests a planned arson event (PLANNED) where the target was related to the offender (TRELATIO) and where physical evidence was left by the offender at the scene (EVIDENCE). This leads to a suggestion that Dimension 1 may be tapping some element of closeness or meaningfulness to offender as well as an element of premeditation, an interpretation supported by patterns in other regions more removed from the center.

Premeditation, especially, seems defensibly suggested by the patterns of variables moving from right to left along Dimension 1. Crime scene variables toward the extreme left reflect many aspects associated with a deliberate and planned arson event, bringing materials (MATERBRO), using accelerants (ACCELER) and trailers (TRAILERS), burning specific items (SPECBURN), and deliberate damage to other target items (ADAMAGE). Variables captured in the region of Cluster 3 seem to especially reflect a deliberate and directed rage, perhaps of a more personal nature because residential properties and vehicles are the targets included in this cluster. Variables toward the right end of Dimension 1 suggest a more random and anonymous arson crime pattern, with a suggestion of disturbance or perverseness (THEFT and SEXACTIV, respectively).

The central region is marked by complete omission of presence of any targeted property variables. Inspection of Figure 1 seems to indicate that a major thrust of Dimension 2 is to differentiate target properties that were large and public institutions (i.e., educational [EDUPROP], state-owned [STATPROP], or commercial [COMPROP] property) toward the top of the figure—positive coordinates) from those that were small and noninstitutional (VEHPROP, or vehicle property; MINPROP, or minor property; BUSPROP, or bush property; toward the bottom of the figure—negative coordinates). (RESPROP, or residential property, is at the zero point along Dimension 2.) The variables captured in the region of Cluster 4 seem especially related to specific targeted destruction of educational and commercial properties where specific items are used to start fires. The suggestion here might relate to a pattern of strong grudge and directed anger against large public institutions. The region defined by Cluster 2 has a defined substructure, differentiated along Dimension 1 where the four variables (MATERBRO, ACCELER, TUNOCCUP or target unoccupied, and MAJFIRE or major fire) to the left of the dotted line are more closely aligned with deliberate planned arson that results in

large fires although in unoccupied, smaller-scale properties. Those variables to the right of the dotted line in Cluster 2 are more suggestive of unplanned random arson events having multiple and exterior points of origin (MULTIPOO and POEXTER, respectively). Targets here tend to be outdoors (BUSPROP and MINPROP) and unrelated to offenders (TUNRELAT). In general, Cluster 2 is differentiated from Clusters 1, 4, and 5 (toward the opposing end of Dimension 2) on the basis of size and institutional nature of property targets, involving a physical man-made structure to destroy (toward the positive pole of the dimension), as well as by the general unprotected nature of the targets where access is relatively easy (toward the negative pole of the dimension). Note, for example, that crime variables linked to having to enter the target (ENTARGET), targets where security systems are present (TSECURTY), targets with a single point of entry (SINGPOO), and educational, commercial, or state-owned property types suggest protected, man-made targets to which offenders have to gain access to start fires—features not captured in the Cluster 2 region.

EXTERNAL PROPERTY VECTOR FITTING

Figures 2 through 4 summarize the property vector fitting analyses designed to explicitly employ specific characteristics in the personal, general, and event-specific variable sets to facilitate interpretation and understanding of the dimensionality of crime scene characteristics. These analyses explicitly link crime scene characteristics to conditional probability patterns that would be most useful in profiling serial arsonists. It should be noted that certain crime scene variables may be missing from specific figures due to the presence of missing observations for that particular variable in the property fitting analysis. Where this occurs, slight but inconsequential perturbations in the preference mapping scaling solution represented will be present. Table 1 provides relevant numerical data (e.g., standardized regression weights, multiple r values, omnibus F-test values, and p values) used to facilitate the property-fitting exercise for the personal, general, and event-specific variable sets, respectively. Table 1 also lists those external property variables whose fitted vectors are not displayed in the figures by virtue of not being significantly predicted by the two-dimensional MDS coordinates. These variables are therefore largely irrelevant for achieving an understanding of the association between crime scene variables and offender-related variables.

Interpretation of Figures 2 through 4, one plot for each of the three conceptual sets of offender-related external variables, is relatively straightforward, especially when interpreted in conjunction with the regions identified in Figure 1 and the interpretations of the dimensions offered in the previous section. Each fitted vector on a figure summarizes the relationship that exists between a specific external offender-related variable and the two dimensions (i.e., the spatial pattern) of the MDS solution. The strength of the relationship is measured by the multiple correlation between the two dimensional coordinates and the conditional probability scores for the variables. The direction of the relationship directly reflects the com-
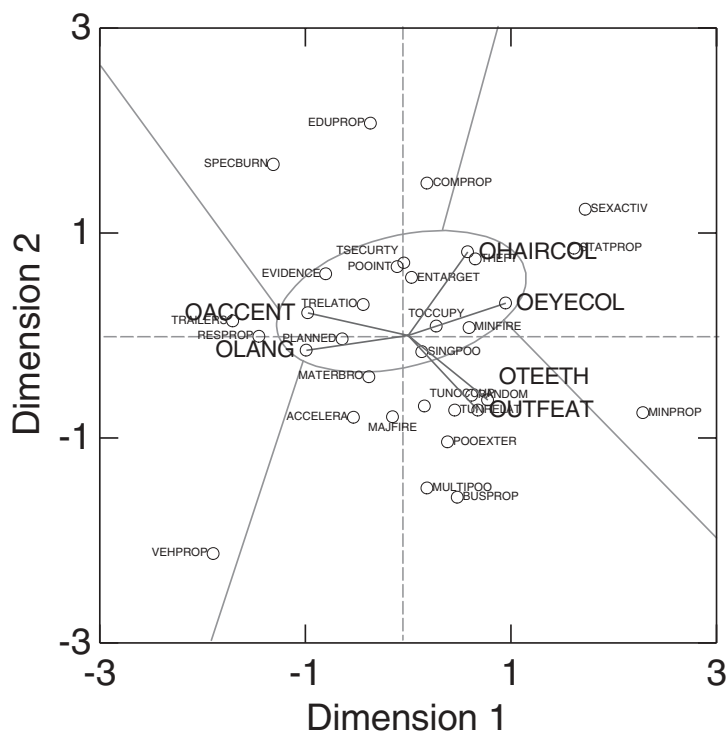
Figure 2   Fitted (Significant) Personal Offender Characteristic Pattern Vectors

bination of signs of the standardized regression weights for the two dimensions. Therefore, movement toward the circle along a particular vector is interpreted as reflecting an increasing tendency (i.e., the conditional probability that the offender-related variable takes on a value of 1 when a crime scene variable takes on a value of 1) for the offender-related variable to take on a coded value of 1 in association with the crime scene variables in the region of the circle and vice-versa when moving in the opposite direction.

Personal offender characteristics. Figure 2 shows fitted property vectors for six significant personal characteristics of offenders. The OLANG (offenders were bilingual) and OACCENT (offenders spoke with accents) vectors showed higher conditional probabilities, with crime scene characteristics falling toward the planning or deliberation end of Dimension 1 and especially oriented toward the Cluster 3 region. Thus, there were higher probabilities that offenders were at least bilingual and spoke with accents at crime scenes where the TRAILERS, RESPROP, and VEHPROP variables took on a coded value of 1. The OHAIRCOL and OEYECOL vectors generally suggested a higher probability of
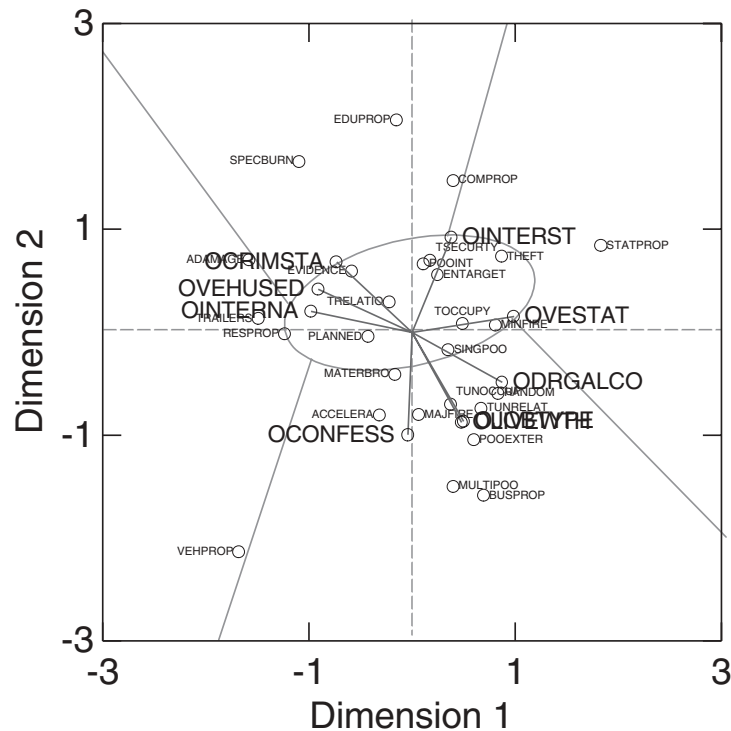
Figure 3   Fitted (Significant) General Offender Behavior Pattern Vectors

offenders having darker hair and eyes, respectively, at crime scenes targeting commercial and state-owned properties and where sexual activity was evident (Cluster 5 orientation). The OTEETH and OUTFEAT vectors revealed higher probabilities of offenders having noticeably imperfect teeth and an outstanding feature, respectively, at the more random outdoor crime scenes that had multiple points of entry and were unrelated to the offender (Cluster 2 orientation). Finally, readers are reminded that the data originate from police records. Consequently, some of the offenders' personal characteristic variables were included to provide descriptive richness to the results. These results should not be interpreted or used in any manner that would suggest racial stereotyping.

General offender behavior variables. Figure 3 shows the fitted property vectors for nine significant general offender behaviors. The OCRIMSTAT, OVEHUSED, and OINTERNA vectors generally suggested higher probabilities of offenders having a prior criminal status, using a vehicle to commit crimes, and having been overseas within the past 10 years, respectively, at crime scenes especially associated with Clusters 2 and 4 and the small subregion of Cluster 1 (using
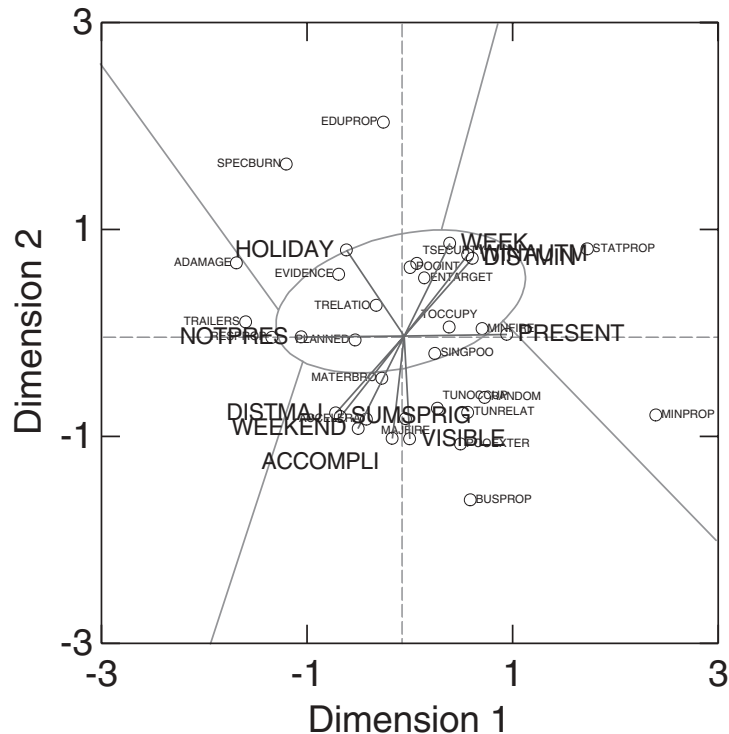
Figure 4   Fitted (Significant) Event-Specific Offender Behavior and Choice Pattern Vectors

trailers, targeting educational and residential properties, causing other damage to targets, starting fires with specific items and where evidence tends to be left). The OINTERST vector revealed a higher probability of offenders having traveled out of state within the past 10 years at crime scenes oriented toward Clusters 4 and 5 and the outer fringes of Cluster 1 (especially targeting educational, commercial, and state-owned properties where theft tends to also occur) the past 10 years, having facial hair, and having darker hair color and shade. The OVESTAT vector showed a higher probability of offenders not owning the vehicle used in a crime at crime scenes especially associated with Cluster 5 and the outer fringes of Cluster 1 (where state-owned properties are targeted, theft tends to occur, and minor fires result). The ODRGALCO, OLIVEWTH, and OJOBTYPE vectors suggested higher probabilities of offenders showing evidence of drug or alcohol use, living with other people, and being employed, respectively, at crime scenes especially associated with Cluster 2 variables (random acts at targets unrelated to offenders, targeting bush properties, with points of origin exterior to the target). The OCONFESS vector suggested a higher probability of offenders having confessed to similar crimes at crime scenes especially associated with the more deliberative

TABLE 1
FIT STATISTICS FOR EXTERNAL
OFFENDER-RELATED PROPERTY VECTORS

Variable	Beta Weight for Dimension 1	Beta Weight for Dimension 2	Multiple Correlation	Omnibus F Test	pValue
Personal set					
Significant variables[a]					
OLANG	−.57	−.09	.58	6.54	.01
OHAIRCOL	.31	.46	.57	6.04	.01
OEYECOL	.54	.19	.58	6.41	.01
OTEETH	.38	−.33	.49	3.92	.03
OUTFEAT	.33	−.37	.49	3.92	.03
OACCENT	−.66	.16	.67	10.44	< .01
Nonsignificant variables					
OAGE, OBUILD,					
OHAIRSHA,					
OHAIRLEN,					
OFACHAIR,					
OODOUR					
General set					
Significant variables					
OINTERST	.22	.63	.66	9.43	< .01
OINTERNA	−.73	.18	.75	15.49	< .01
OLIVEWTH	.33	−.70	.78	18.75	< .01
OJOBTYPE	.24	−.48	.54	4.91	.02
ODRGALCO	.43	−.25	.52	4.53	.02
OCRIMSTA	−.36	.40	.57	5.76	.01
OCONFESS	−.33	−.35	.46	3.31	.05
OVEHUSED	−.51	.43	.67	10.45	< .01
OVEHSTAT	.67	.10	.68	10.95	< .01
Nonsignificant variables					
OLIFESTY, OSEXHAB,					
OMENPROB,					
OPOSPROP,					
OVEHTYPE					
Event-specific set					
Significant variables					
DISTMAJ	−.48	−.56	.74	15.20	< .01
DISTMIN	.48	.56	.74	15.20	< .01
ACCOMPLI	.16	−.65	.67	10.75	< .01
VISIBLE	.19	−.62	.65	9.52	< .01
PRESENT	.52	.07	.53	4.99	.01

(continued)

TABLE 1 (continued)

Variable	Beta Weight for Dimension 1	Beta Weight for Dimension 2	Multiple Correlation	Omnibus F Test	pValue
NOTPRES	−.52	−.07	.53	4.99	.01
WEEK	.40	.72	.69	9.35	< .01
WEEKEND	−.40	−.72	.69	9.35	< .01
HOLIDAY	−.28	.37	.54	4.29	.03
SUMSPRIG	−.48	−.54	.58	5.31	.01
WINAUTM	.48	.54	.58	5.31	.01
Nonsignificant variables					
THREAT, ACALLS,					
AEXTIN, NIGHT, DAY					

NOTE: OLANG = offenders were bilingual or multilingual; OHAIRCOL = offenders had darker hair; OEYECOL = offenders had darker eyes; OTEETH = offenders had noticeably imperfect teeth; OUTFEAT = offenders had outstanding features; OACCENT = offenders spoke with accents; OAGE = offenders' age; OBUILD = offenders' build; OHAIRSHA = offenders' hair shade; OHAIRLEN = offenders' hair length; OHAIRCOLoffenders' hair colour; OFACHAIR = offenders' facial hair; OODOUR = noticeable offender odour; OINTERST = offenders traveled out of state within the past 10 years; OINTERNA = offenders had been overseas within the past 10 years; OLIVEWTH = offenders lived with other people; OJOBTYPE = offenders were employed; ODRGALCO = offenders showed evidence of drug or alcohol use; OCRIMSTA = offenders had prior criminal status; OCONFESS = offenders confessed to similar crimes; OVEHUSED = offenders used a vehicle to commit crimes; OVEHSTAT = offenders' vehicle status; OLIFESTY = offenders' general lifestyle; OSEXHAB = offenders' sexual habits; OMENPROB = offenders displayed symptoms or had been treated for mental problems; OPOSPROP = offenders possessed others's property; OVEHTYPE = offenders' vehicle type; DISTMAJ = offenders traveled more than 1 km to the target; DISTMIN = offenders traveled less than 1 km to the target; ACCOMPLI = offenders had accomplices in committing the arson; VISIBLE = offenders lit fire in highly visible location with potential witnesses; PRESENT = offenders were present at the crime scenes watching the fires; NOTPRES = offenders were not present at the crime scenes watching the fires; WEEK = offenders set fires on weekdays; WEEKEND = offenders set fires on weekends; HOLIDAY = offender sets fires during some type of holiday period; SUMSPRIG = offenders set fires during the summer or spring seasons; WINAUTM = offenders set fires during the winter or autumn seasons; THREAT = offenders made threats to someone about committing arson; ACALLS = offenders reported fires they actually started; AEXTIN = offenders were involved in attempts to extinguish fires they actually set; NIGHT = offenders set fires at night; DAY = offenders set fires during the day.
a. Only significant offender-related variables will have the fitted property vectors displayed in Figures 2 through 4.

subregion of Cluster 2 (where accelerants are used, a major fire results, and materials are brought to the target by offenders).

Event-specific offender-behaviors and choices variables. Figure 4 shows the fitted property vectors for 11 significant event-specific offender behaviors and choices. It should be noted that some of these vectors are concerned with offenders' choice of timing for arson crimes, and the remainder concern offenders' actions taken in relation to a specific arson event. The timing-related vectors will

be interpreted first. The HOLIDAY vector suggested a higher probability of offenders committing arson during holiday periods at crime scenes particularly associated with Cluster 4 and the small subregion of Cluster 1 (where educational properties are targeted, specific items are used to start the fire, evidence is left behind, the offender is related to the target, and other damage is done at the target). This relationship pattern is probably most closely linked to vandalism activity at schools during holiday periods. The WEEK vector was oriented more toward both Cluster 4 and 5 variables and the outer fringes of Cluster 1. Here, a higher probability of offenders choosing weekdays for their crimes was associated with crime scenes showing features such as educational or state-owned properties, where security systems were present, theft was likely to have occurred, point of origin of the fire was interior to the target, and there was evidence that offenders actually entered the target. The WEEKEND vector showed the opposite directional trend where offenders tended to choose a weekend day to start their fires, which was associated with those crime scene variables located in the more deliberative sub-region of Cluster 2 (where materials were brought to the target, accelerants were used, and a major fire resulted). The SUMSPRIG and WINAUTM vectors tended to work almost in parallel (i.e., showing nearly identical association patterns) with the WEEKEND and WEEK vectors, respectively.

With respect to event-specific offender behaviors, the PRESENT vector suggested a higher probability of offenders actually being present at the crime scene during the fire, at crime scenes associated with Cluster 5 (where the crime was random rather than planned, state-owned property or minor property had been targeted, small fires resulted, and where theft was likely to have occurred). The NOTPRES vector worked in the opposite direction, suggesting that offenders tended not to be present where crimes had been planned and accelerants and trailers had been used. The ACCOMPLI and VISIBLE vectors were nearly parallel and revealed higher probabilities of offenders working with accomplices and starting fires in visible areas with possible witnesses at crime scenes associated strongly with Cluster 2 features (where targets tended to be outdoors with multiple and exterior points of origin for fires, where targets were unoccupied, where the crime tended to be random rather than planned, and where a major fire ensued).

DISCUSSION

The results have produced an empirical model for serial arson crime scene behaviors (depicted in Figure 1) that can be systematically associated with probable offender characteristics (see Figures 2-4). The model depicted in Figure 1 shows that serial arson crime scene behaviors are composed of a centrally located constellation of common behaviors surrounded by four outlying patterns. Each of these four outlying patterns represents a distinct and coherent style to the commission of a serial arson attack.

Focusing first on the central cluster, it can be seen that serial arson is composed of a broad constellation of common behaviors, which also contains a further subset of behaviors (shown by the smaller dotted ellipse) that are more closely related to crime scene behaviors to the left of Figure 1. These common behaviors provide a core description of the characteristic behaviors common to all forms or patterns of serial arson. The subset indicates that crime patterns toward the left of Figure 1 are quite likely to contain these three specific behaviors. Thus, for example, Cluster 3 will have a very high propensity for planning in the commission of the offence, a relationship between the victim and target, and evidence left at the crime scene.

A number of interesting theoretical implications emerge when considering the significance of the behaviors located in the common behavior cluster. The common presence of planning and evidence in the commission of most offences is at odds with the basic tenet of the organized-disorganized behavior dichotomy. The main premise of the dichotomy is the categorical distinction of behaviors by their offence sophistication. The presence of planning suggests an organized offender, and its absence is indicative of a disorganized offender. However, given that planning is located in the common behavior cluster, generally all serial arson offences will typically involve planning, which therefore serves to question the validity of such a categorical distinction. Similarly, the common presence of evidence at most serial arson crime scenes is not congruent with the postulates of the organized-disorganized dichotomy, which cites the detection of evidence as a key indicator of a disorganized offender (Douglas et al., 1992).

Planning as an apparently central element to all serial arson offences is matched by the observation that some form of relationship usually exists between victims and offenders. This result is contrary to previous conceptions, which describe these crimes as seemingly random and motiveless (e.g., Holmes & Holmes, 1998) and suggests that at some psychological level, there is indeed coherency or the proverbial method to their madness. Examples of this relationship can range from cognitive knowledge of their environment to some internal fantasy that is then superimposed on presented targets. From an investigative perspective, this point may prove especially useful as it suggests that a careful consideration of the target is likely to provide some insight into offenders. Indeed, the nature of this relationship may become especially more overt when considered in conjunction with behaviors derived in one of the outlying patterns.

This theme of planning as a central element to all offences is congruent with those previously observed by Kocsis, Cooksey, and Irwin (2002) and Kocsis, Irwin, and Cooksey (2002) in sexual murder and rapes and to some extent by Canter and Fritzon (1998). Indeed, these findings match those previously found by Kocsis et al. (1998) in highlighting the theoretical limitations of the organized-disorganized dichotomy and suggest its reconsideration beyond a categorical classification and perhaps into a conceptual continuum. Indeed, a tentative indication of such a continuum model can be conceived when examining behaviors in Figure 1 along Dimension 1 or from left to right.

Looking at the other actions encompassed by the common behaviors cluster, a number of other features emerge in the inherent nature of serial arson crimes. Provided targets are structures, arsonists commonly enter targets, steal items if available, and then initiate small fires via single internal points of origin. This is particularly interesting as offenders may engage in such behaviors although targets may be equipped with various security and/or fire retardant devices or even occupied by individuals who may detect and apprehend them. This constellation of behaviors suggests that the inherent psychological nature of serial arson is a somewhat brazen crime that does not concord with common behavior patterns observable in other crime modalities such as murder or rape in which offenders are typically deterred by a greater degree of risk in apprehension or a diminished capacity to complete their crimes (Kocsis, Cooksey, & Irwin, 2002; Kocsis, Irwin, & Cooksey, 2002).

Turning to the first of the outlying behavior patterns, the thrill pattern (Cluster 2) is the only outlying pattern that also contains a subset of behaviors differentiated along Dimension 1 (i.e., from left to right) of Figure 1. The thrill pattern embodies a somewhat sporadic style of offence. However, this sporadic nature should not be mistaken for incoherence such as with the classic disorganized offender category but rather indicates that multiple targets may be attacked. This nuance is more apparent when it is recognized that the thrill pattern can nonetheless demonstrate quite sophisticated and premeditated behaviors.

Indeed, the distinguishing element between the subsets of the thrill pattern is evidence of such behavioral sophistication such as the use of various resources to initiate a fire. Thus, the subset to the left is represented by behaviors such as offender use of materials and accelerants that subsequently achieve a much larger fire. The subset to the right is characterized more by behaviors concerned with committing multiple attacks on comparatively unrelated targets. Greater insight into the nature of any offender target relationship becomes apparent when it is recognized that the predominant target in this pattern is some form of bush, forest, or vegetation. Consequently, the scope of possible relations between such targets is lessened in comparison to other targets such as residences against whose occupants offenders harbor prior grievances.

A curious set of offender characteristics is associated with this style of offence. In physical appearances, these offenders tend to have poor dental work and some type of outstanding physical feature (e.g., scarring). In addition, this pattern will typically be composed of multiple offenders who are employed, live with others (i.e., are not social loners), and ingest alcohol and/or drugs prior to the commission of offences. As they commonly travel over 1 mile to commit offences, they will typically be quite mobile. Looking at temporal features, these offenders usually commit their offences in the summer or spring and predominantly on weekends. Finally, striking characteristics also typically emerge from these offenders. First, they will initiate a fire in a highly visible location where they may be potentially identified and apprehended. Second, upon apprehension, these offenders are likely to confess to having committed similar other crimes.

What emerges from this pattern are older individuals who are socially competent in their lives and cognitively aware of their actions yet engage in a high degree of risk to commit arson (hence the thrill label for this pattern). Unlike the other patterns discussed herein, no significant element of animosity appears to exist with this pattern. Instead, these offenders seem to derive satisfaction from the destruction of property. Although they are not explicitly sexual in their behaviors, the fact that these offenders are typically older and physically unattractive may suggest the sublimation of a possible sexual drive. Thus, this pattern holds some similarities to the broad excitement category proposed by Douglas et al. (1992). This pattern seems to capture the theme of a recreational fascination with fire. Some anecdotal case examples of this psychological pattern include restless firefighters seeking to create some action for themselves or bored teenagers deriving excitement from the risk of igniting fires. These scenario-based examples are quite different, but both share the underlying theme of the thrill pattern in creating excitement or entertainment for themselves through setting fires.

Moving to the next outlying behavior pattern (Cluster 3), labeled the *anger* pattern, we find a style of offence in which some animosity or rage seems to find expression in the commission of an arson attack. A significant feature of this behavior pattern is that targets are predominantly residential properties or motor vehicles. This distinction in target selection is important as it suggests the violence in the crime is associated with expressing or inflicting personalized harm rather than general destruction inflicted on an intangible organization or entity. Indeed, this intent to cause harm also finds expression in the other two characteristic behaviors in this pattern. First, offenders employ trailers to ensure the thorough spread of the fire. Of more significance, however, is that offenders' anger will typically find further expression in physically destroying household items in addition to the subsequent damage caused by igniting fires. So, for example, the offender will enter the residence and then manually destroy some of the household items (e.g., television or stereo system) before lighting a fire.

The perpetrators of such crimes in this sample tend to be foreign nationals who are bilingual and consequently tend to possess noticeable accents. They also have a certain degree of financial stability, as they possess and use vehicles for transport. Finally, the burning of targets does not appear to hold any deeper psychological meaning other than to inflict harm, and consequently, offenders promptly leave crime scenes once fires have been lit.

At a cursory level, there are similarities between the anger pattern and previously developed conceptions such as the revenge-motivated arsonist by Douglas et al. (1992) or the instrumental person proposed by Canter and Fritzon (1998). However, a number of important differences do exist between these previous conceptions and the anger pattern. Foremost among these is the nature of the relationship between offenders and targets. Both the revenge motive and the instrumental person pattern share the identical theme of retaliation and retribution as the underlying motives of the offences. However, the concept of prior relations between targets and offenders in this study is based more on cognitive knowledge or recogni-

tion of targets. Consequently, offenders in the anger pattern may not actually possess any previous animosity toward the target but may instead attack due to some perceived familiarity or recognition, although not necessarily due to the existence of a grievance with the specific target. This distinction is further highlighted as the anger pattern describes the actions of serial arsonists, whereas the revenge motive and instrumental person are both primarily conceived as nonrecidivistic offences that find expression in very specific targets. Indeed, the theme of the anger pattern is similar to that found by Kocsis, Cooksey, and Irwin (2002) and Kocsis, Irwin, and Cooksey (2002) in studying sexual murderers and rapists, both of which contained a behavior pattern demonstrating the expression of an unfocused internal rage on targets.

Cluster 4 has been labeled the *wanton* pattern. The theme of this pattern appears to be a generalized sentiment of animosity visited on a vague class of targets. Thus, the wanton pattern predominantly features attacks on educational facilities such as schools and universities or on commercial properties or business establishments. In addition, offenders in this pattern will initially ignite specific items within targets, suggesting some specific meaning in the initial destruction of these items. Typical offender characteristics associated with this pattern include a prior criminal history and a proclivity for offenses to be committed on weekends.

There is some similarity between the theme of the wanton pattern and previous categorizations such as vandalism-motivated arsons (Douglas et al., 1992) or the instrumental object offence pattern described by Canter and Fritzon (1998). They are similar in that the attacks are of an unfocussed nature. However, akin to the observations in the anger pattern, these previous categorizations were not specifically developed in considering the actions of serial offenders. Focussing exclusively on the targeting of educational facilities, some resemblance does exist between the wanton pattern and a crime phenomena referred to as school fires (Burns, 1991) in which juveniles specifically attack educational facilities. This specific scenario also accommodates offences that occur predominately on weekends. Nonetheless, these previous conceptions fail to adequately explain the potential existence of an element of animosity as expressed by the initial burning of specific items or the propensity for commercial properties to also be attacked in similar circumstances. Clearly, this pattern will warrant further scrutiny in future research.

The fifth and final cluster is labeled the *sexual* pattern and embodies an offence style in which offenders associate the ignition of fires with sexual excitement and/ or gratification. The most distinguishing behavioral element to this pattern is evidence of sexual activity by offenders in or nearby the crime scene. The common target in this offence pattern is state-owned (public) premises that are easily accessible such as trash receptacles, post boxes, public toilets, or any other publicly accessible facilities. These arson attacks are relatively minor in size and do not typically escalate into major fires that may cause serious destruction. Indeed, this

pattern demonstrates the lowest amount of behavioral sophistication and as such, within the regional interpretation of the data, is found in the far right of Figure 1.

Looking at typical offender characteristics associated with this pattern, offenders are likely to have dark colored hair and eyes and a history of domestic travel, although not via their own vehicles. In the commission of their offences, these offenders do not generally travel far and typically light fires on weekdays and during winter and/or autumn months. However, most significant is that these offenders have a tendency to remain at the crime scene, typically to observe the fires and/or their extinguishments.

The sexual pattern has a number of clear similarities with previous psychiatric and/or psychological studies of arsonists as representations of forms of sexual perversion or paraphilic compulsion (e.g., Barnett & Spitzer, 1994; Lewis & Yarnell, 1952). However, within the context of the profiling literature, the sexual pattern has a number of similarities to the excitement motive by Douglas et al. (1992) or the expressive object offence pattern observed by Canter and Fritzon (1998). Indeed, the expressive object pattern is described as the only arson behavior pattern that is recidivistic in nature in terms of selecting public buildings as common targets and is believed to be committed to achieve some form of emotional relief. Despite these similarities, a number of significant inconsistencies are also apparent. Whereas the expressive object pattern is said to be instigated to achieve some emotional relief, the nature of this relief is not typically explicit and consequently may not equate with sexual perversion. In addition, the selected targets described in the expressive object are large structures (e.g., hospitals, businesses), whereas the typical victim class in the sexual pattern can be conceived more in the nature of minor nuisance fires on small, public, and easily accessed targets.

In conclusion, these results do not represent an exhaustive appraisal of serial arson behavior patterns but rather offer a previously unavailable empirical model on which such behaviors can systematically be assessed. The key feature of this model is a holistic depiction of all potential behavioral patterns, both common and discriminatory, which was not initially formulated on the inference of potential motives. It is hoped that this model will have a number of effects in both the research and the practice of criminal psychological profiling. With respect to the actual practice of profiling, this model now provides an empirically robust basis on which future serial arson crime series may be assessed and may provide insight to both offence style and offender characteristics. It is hoped that this model will also provide impetus for further research into the crime of serial arson. Examples could include an examination of psychological factors that instigate offences in the various patterns, temporal trends between offences, or measured effectiveness of varying investigative tactics dependent on the style of the offences committed. Indeed, replication of this study and comparison of the underlying patterns to other crime modalities such as murder and rape may offer some higher theoretical insight into the nature of serial violent crimes. It is hoped that the options and answers to such research and development lie in the not-too-distant future.

APPENDIX
Variable Sets, Names, and Definitions for the Serial Arsonist Data Set

Variable Set	Variable Label	Definition (Category Labels and Coding)
Personal offender characteristics		
	OAGE	Offender's age (20 years old or younger = 0; 21 years or older = 1)
	OLANG	Offender's language background (monolingual = 0; bilingual = 1)
	OBUILD	Offender's build (small = 0; medium or large = 1)
	OHAIRSHA	Offender's hair shade (lighter = 0; darker = 1)
	OHAIRLEN	Offender's hair length (short or none (1-3) = 0; medium or long (4-6) = 1)
	OHAIRCOL	Offender's hair colour (red, grey, or white = 0; brown or black = 1)
	OEYECOL	Offender's eye colour (light eyes = 0; dark eyes = 1)
	OTEETH	Offender's teeth (not noticed = 0; noticeably imperfect = 1)
	OFACHAIR	Offender's facial hair (no = 0; yes = 1)
	OOUTFEAT	Outstanding offender physical features (no = 0; yes = 1)
	OACCENT	Offender's accent (no = 0; yes = 1)
	OODOUR	Noticeable offender odour (no = 0; yes = 1)
General offender behavior variables		
	ODRUGALC	Offender showed evidence of drug/alcohol use (no = 0; yes = 1)
	OINTERST	Offender visited interstate in past 10 years (no = 0; yes = 1)
	OINTERNA	Offender lived or visited internationally during past 10 years (no = 0; yes = 1)
	OLIVEWTH	Offender living alone (8) = 0; with others (1-7) = 1
	OJOBTYPE	Offender's job type (unemployed = 0; employed = 1)
	OLIFESTY	Offender's general lifestyle: noncriminal (1,2,4,8,11-13) = 0; criminal: 3,5-7,9-10 = 1
	OCRIMST	Offender's criminal status (non-offender = 0; statutory release = 1)
	OSEXHAB	Offender's sexual habits (heterosexual = 0; homosexual or bisexual = 1)
	OMENPROB	Offender displayed symptoms or had been treated for mental problems (no = 0; yes = 1)

(continued)

APPENDIX (continued)

Variable Set	Variable Label	Definition (Category Labels and Coding)
	OPOSPROP	Offender possessed other's property (no = 0; yes = 1)
	OCONFESS	Offender admitted to other similar crimes of violence (no = 0; yes = 1)
	OVEHUSED	Offender used a vehicle in this incident (no = 0; yes = 1)
	OVEHSTAT	Offender's vehicle status (owned = 0; not owned = 1)
	OVEHTYPE	Offender's vehicle type (car = 0; van, jeep, or truck = 1)
Event-specific offender behavior and choice variables		
	THREAT	Offender makes a threat to someone about committing the arson (no = 0; yes = 1)
	DISTMAJ	Offender travels more than 1 km to the target (no = 0; yes = 1)
	DISTMIN	Offender travels less than 1 km to the target (no = 0; yes = 1)
	ACCOMPLI	Offender had accomplices in committing the arson (no = 0; yes = 1)
	VISIBLE	Offender lit fire in highly visible location with potential witnesses (no = 0; yes = 1)
	PRESENT	Offender was present at the crime scene watching the fire (no = 0; yes = 1)
	NOTPRES	Offender was not present at the crime scene watching the fire (no = 0; yes = 1)
	ACALLS	Offender reports the fire he actually started himself (no = 0; yes = 1)
	AEXTIN	Offender is involved in attempts to extinguish the fire he actually set (no = 0; yes = 1)
	NIGHT	Offender set the fire at night (no = 0; yes = 1)
	DAY	Offender set the fire during the day (no = 0; yes = 1)
	WEEK	Offender set the fire on a weekday (no = 0; yes = 1)
	WEEKEND	Offender set the fire on a weekend day (no = 0; yes = 1)
	HOLIDAY	Offender set the fire during some type of holiday period (no = 0; yes = 1)
	SUMSPRIG	Offender set the fire during the summer or spring seasons (no = 0; yes = 1)
	WINAUTM	Offender set the fire during the winter or autumn seasons (no = 0; yes = 1)

APPENDIX (continued)

Variable Set	Variable Label	Definition (Category Labels and Coding)
Crime scene variables		
	SINGPOO	Fire was lit from a single point of origin or location (no = 0; yes = 1)
	MULTIPOO	Fire was lit from multiple points of origin or locations (no = 0; yes = 1)
	POOEXTER	Point of origin of fire was a location exterior to the target (no = 0; yes = 1)
	POOINT	Point of origin of fire was a location interior to the target (no = 0; yes = 1)
	MATERBRO	Offender consciously brought materials to start the fire to the target (no = 0; yes = 1)
	ACCELERA	An accelerant was employed by the offender to light the fire (no = 0; yes = 1)
	TRAILERS	There was evidence of a trailer (detectable burn line of liquid accelerant) used at the fire (no = 0; yes = 1)
	PLANNED	There was evidence the arson was planned with a specific intended target (no = 0; yes = 1)
	RANDOM	There was evidence that the arson was unplanned or random (no = 0; yes = 1)
	ENTARGET	Offender actually entered the target to light the fire (no = 0; yes = 1)
	MAJFIRE	The resulting fire caused major damage (no = 0; yes = 1)
	MINFIRE	The resulting fire caused minor damage (no = 0; yes = 1)
	SPECBURN	Specific items were initially burned by the offender to start the fire (no = 0; yes = 1)
	ADAMAGE	Additional damage, other than fire damage, was caused by the offender, for example, vandalism (no = 0; yes = 1)
	THEFT	Offender stole something from the target (no = 0; yes = 1)
	EVIDENCE	Physical evidence was left by the offender at the crime scene (no = 0; yes = 1)
	SEXACTIV	There was evidence that the offender engaged in some sexual activity at the crime scene (no = 0; yes = 1)
	RESPROP	The target was a residential property such as a house or apartment (no = 0; yes = 1)

(continued)

APPENDIX (continued)

Variable Set	Variable Label	Definition (Category Labels and Coding)
	COMPROP	The target was a commercial property such as a business, used for work, not living (no = 0; yes = 1)
	EDUPROP	The target was an educational facility such as a school (no = 0; yes = 1)
	STATPROP	The target was a state-owned property such as a government building or police station (no = 0; yes = 1)
	VEHPROP	The target was a motor vehicle such as a car, motorcycle, or truck (no = 0; yes = 1)
	MINPROP	The target was a minor item such as a rubbish bin, letterbox, or abandoned property (no = 0; yes = 1)
	BUSPROP	The target was a bushland or forest, possibly including property, fences, and hedges (no = 0; yes = 1)
	TOCCUPY	The target was occupied by people at the time of the fire (no = 0; yes = 1)
	TUNOCCUP	The target was not occupied by people at the time of the fire (no = 0; yes = 1)
	TRELATIO	The offender had some relationship with the target such as their school or workplace (no = 0; yes = 1)
	TUNRELAT	The offender had no relationship with the target
	TSECURTY	The target had some form of security system, fire alarm, sprinkler systems, and so forth (no = 0; yes = 1)

ACKNOWLEDGEMENTS

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