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The Criminal Mind Under the Forensic Lens: A Critical Narrative Review of Criminal Psychology, Criminology and Forensic Evidence

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Abstract

Understanding criminal behavior involves consideration of psychological processes and social circumstances and the physical traces a criminal offense leaves behind. This critical narrative review explores the interface of criminal psychology, criminology and forensic science with particular reference to the distinction between providing behavioral-based hypotheses for investigation and providing evidence-based proof of a criminal's guilt. In order to achieve these objectives a range of scholarly papers and official scientific reports have been selected for review concerning topics such as developmental antisocial behavior, offense opportunity, offender profiling, mental disorder and offender behavior, confession evidence, and the reliability of various types of forensic evidence. Although it is possible to provide behavioral-based explanations of most criminal behavior and for these to form the basis of useful investigation hypotheses it is not always possible on the basis of a crime scene to provide reliable psychological-based explanations of the behavior of a criminal at that scene. Moreover, the fact of association of various types of physical evidence with offenders in a number of cases does not mean that these same types of evidence can be used to provide proof of a criminal's guilt in respect of a number of different aspects of an offense including the criminal's motive. In particular, the processes of source attribution, activity reconstruction, and psychological interpretation provide useful boundary conditions for understanding the provision of criminalistic-based observation, competing explanations, predictions and conclusions within evidence constrained framework. Five tables and three figures have been provided in order to facilitate an understanding of the interface of the various disciplinary areas mentioned and in order to provide practical safeguards. In addition, in order to ensure that in the future sufficient validation studies are carried out on any new technique or method of investigation, and that the results obtained are applicable to a number of different cultures, that adequate provision is made for the expression of uncertainty in all investigations, and that contamination of any type of information is prevented, these aspects have been given due priority.

Keywords: Criminal Psychology; Criminology; Forensic Science; Behavioral Evidence; Investigative Interviewing; Cognitive Bias

Abbreviations

BCL: Behavioural Case Linkage; CP: Criminal Psychology; DNA: Deoxyribonucleic Acid; FS: Forensic Science; HF: Human Factors; NIST: National Institute of Standards and Technology; NIST IR: National Institute of Standards and Technology Interagency Report; OP: Offender Profiling

Introduction

This review examines the focus for criminal investigation concerning events, identity, behavior and responsibility. In terms of reasoning different types of inquiry are necessary and these must be kept distinct. A biological trace may assist with the issue of source but an interview may expose inconsistency in account given whereas contextual issues could indicate a motive. The convergence of different types of evidence is of value only if the limits of each type of contribution are clear.

The term "criminal mind" itself can provide an interesting starting point for investigation. As noted earlier, however, the term describes no single psychological entity, and accounts of offending behavior can be provided at a number of different levels (developmental, psychiatric etc.). Furthermore, the different psychiatric diagnoses with violent risk factors are found in different

Table 1: Disciplinary contributions and interpretive boundaries.

Perspective	Primary contribution	Boundary
Psychology	Cognition and behavioral formulation	Formulation is not proof of participation
Developmental criminology	Onset and persistence of antisocial conduct	A trajectory cannot be inferred from a scene
Situational criminology	Access and opportunity structures	Opportunity does not establish identity
Forensic science	Trace evaluation and event reconstruction	Source findings do not establish motive

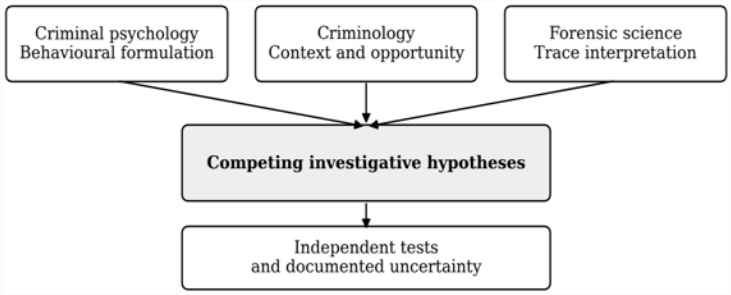


Figure 1: Disciplinary perspectives within an evidence-guided inquiry.

proportions in different populations and thus provide no means of determining whether any particular individual has committed a particular offense [1, 2].

This review considers psychological aspects of suspecting and accusing others of crimes, and places these interpretations under the forensic microscope of the various observations which may support them, of alternative interpretations which may also be justified and of the evidence which could contradict them. It also looks at the minds of investigators and experts and discusses the various influences which this human activity could be subject to [3]. The review also sets out to argue that in an interdisciplinary context, assistance in forming hypotheses is increased while at the same time the borders between assistance in investigating, clinical assessment and forensic conclusion are maintained.

Objectives and Review Approach

This review examines several objectives including an evaluation of developmental and situational explanations for offense behavior, an assessment of behavioral profiling and case linking, the limits of interpretation from available forensic evidence and methods for ensuring quality in multidisciplinary decisions. Also reviewed are issues concerning the use of interviewing and various cognitive biases which can affect the evidence available for later interpretation. Sources for the review were identified through targeted online searches for scholarly records, research papers and forensic reports relevant to the objectives of the review. These sources included the foundational theoretical work in the area, as well as examiner studies that provided empirical evidence, published evidence synopses and reports from the National Institute of Standards and Technology. In this paper, no attempt has been made to comprehensively search databases, to register a protocol, to formally assess bias, or to quantify results. The paper is therefore a critical narrative review of sources compared by research question, by value to the current evidence on individual cases, and by limitations of application. The framework presented for the proposed framework is an original conceptual synthesis. The operational benefits of using such a framework are proposed and require evaluation in prospective studies.

Psychological Pathways and Criminological Context

Developmental trajectories

Crimes are single events within the overall developmental history of an individual and hence cannot be characterized by reference to the individual committing the offense. The taxonomy developed by Moffitt [1] distinguishes between adolescents limited to a phase of life and conducting antisocial behavior throughout their lives and persistently, and those with life course persistent antisocial behavior. While it is useful to explore how earlier conduct by an unknown offender, or even the protective circumstances in their life, fits into a theoretical pathway, there is a danger of jumping to an attractive conclusion and replacing missing information with information that fits within the developmental offense category for that type of offender.

Opportunity and the social environment

The psychological formulation will often be more informative if it includes details of the setting in which the person's behavior takes place. A structural/crime prevention perspective such as that provided by routine activity theory [4] highlights the circumstances in which an offender's behavior is enabled by the convergence of a motivated offender, a suitable target and the absence of guardianship. Access to settings and an individual's routine, as well as their relationships with others, are all factors that a forensic practitioner would need to take into account. It is also important to consider the available resources within a setting. The author's experience of familiarizing himself with a building to plan and commit a crime is not due to any exceptional planning but as a result of his normal role within that building. As above, his selection of a target was not on the basis of any particular psychological preference and was in part due to their ease of access. Table 1 outlines the disciplinary perspectives in more detail and Figure 1 demonstrates how these perspectives interact within the shared context of an evidential inquiry.

Mental disorder and psychological formulation

Mental disorder is not a general explanation for criminal behavior, nor is it in itself sufficient as case evidence. Whiting and colleagues [2] outlined a number of different mental disorders that

Table 2: Observed findings and the risk of psychological overinterpretation.

Finding	Possible hypothesis	Required caution
Displaced belongings	Searching or resistance	Ordinary disorder and later alteration remain alternatives
Selected property removed	Familiarity or prior information	Visible valuables may explain selection
Similar offence behavior	Possible common offender	Similarity requires corroboration
Suspected bite injury	Interpersonal interaction	Do not infer identity or motive from appearance
Nervous interview presentation	Stress or perceived threat	Nervousness is not a reliable guilt indicator

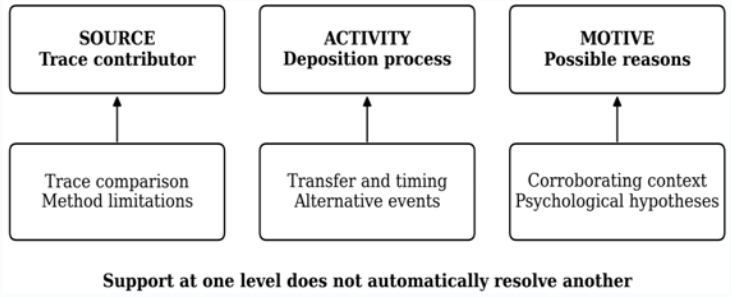


Figure 2: Separate levels of forensic and psychological interpretation.

have been associated with offending and highlighted the importance of acknowledging a variety of risk factors including substance misuse by both the individual with mental disorder and/or offender(s) and previous offending. A psychological formulation for an unknown offender might address issues relevant to that individual and noted with uncertainty. This would include issues relating to perceived threat, interpersonal issues and objectives such as financial gain. The assessment of psychological functioning, the explanation for behavior and the attribution of an offense are distinct tasks with different requirements.

Behavioral Analysis and Offender Profiling

Observation and inference

The first discipline of a behavioral analysis is to separate observation from explanation. Thus, for example, findings of a disturbed room, missing items, or even injuries are to be distinguished from interpretations of anger, ritualism, or even intentional concealation. A room in disarray can also have been searched, be the site of resistance, be in a state of utter chaos, or be changed after the event. An injury's appearance does not in itself prove any aspect of an offender's emotional or psychological experiences, or their personality or mental health. In this review's framework, their behavioral and psychological interpretations are recorded with alternative views that the data may support. Common misapplication of findings to extreme behaviors of violence are noted in Table 2 and contrasted with findings' support of narrower conclusions.

Profiling and behavioral case linkage

Offender profiling involves generating a characteristic of an unknown offender from offense information. Behavioral case linkage involves determining whether or not separate offenses were committed by the same offender. While methodological progress has been reported for offender profiling in a recent synthesis by Fox and Farrington [5], however, there are relatively few studies that have evaluated the usefulness of profiling in practice. In contrast, empirical case linkage has fared somewhat better in terms of research performance, but it is not guaranteed to deliver successful results in every case. Much more important is that a suspect can't be cleared solely on the basis of not corresponding to a profile, nor can he be identified solely on the basis of corresponding to a profile. The workings of an offender's behavior need to be corroborated. The same behavior can be committed by others, and one and the same offender can act differently under changing circumstances. The result of forensic investigation should be a working hypothesis which can be corrected.

Forensic Evidence and the Boundaries of Interpretation

Source activity and motive

Findings in forensic science should be evaluated at the level of the proposition they express. The issue of source attribution of a trace needs to be distinguished from that of the activity in which it was left and the psychological interpretation of conduct for which it is evidence. Strong support for a proposition at one of these levels does not necessarily mean support at the other levels. In other words, knowing an individual's source does not have to reveal the time and manner of transfer of that individual's trace. In addition, knowing an individual's source does not have to reveal that individual's activity, and knowing an individual's activity does not necessarily reveal that individual's motive. These distinctions are depicted in Figure 2.

Forensic odontology and bite injuries

The suspected bite injury in this case is a classic example of how we forensic folks often rush from our observations to our conclusions. The scientific foundation review of the methods supported by NIST found a lack of supporting scientific evidence for several critical assumptions that underpin the practice of identifying individuals from bite marks to human skin. Note that this is a limitation of this particular practice of forensic odontology and should not be extended to all forensic odontology. Further, psychological interpretation of a bite mark is not automatically equal to establishment of dominance, sexua1 intent or characterization. Documentation of an injury, attribution of that injury to a source and a determination of the source's intent or character are separate functions. Much uncertainty in forensic findings can't be alleviated by the intellectual interest of a behavioral scenario constructed on top of them.

Table 3: Selected evidence and its relevance to investigation.

Source	Direct contribution	Application limit
Moffitt [1]	Developmental taxonomy	Population theory does not identify an offender
Fox and Farrington [5]	Profiling and linkage synthesis	Operational effectiveness needs direct evaluation
Whiting *et al.,* [2]	Diagnosis specific violence associations	Associations do not establish case responsibility
Ulery *et al.,* [6]	Empirical fingerprint decision study	Performance depends on study conditions
Kassin *et al.,* [7]	Confession risks and safeguards	An account requires independent checking
Sauerwein *et al.,* [8]	Bite mark foundation review	Skin mark attribution has major evidential limits

Reliability and human judgement

An empirical examiner study was conducted by Ulery *et al.,* [6] to assess the accuracy and reliability of decisions made by latent print examiners. Importantly, performance is measured under controlled circumstances and results cannot be used to estimate an error rate for all scenes, specimens, methods and examiners. The claims of reliability thus have to be related to the specific circumstances under which they were established. Even findings seemingly consistent with each other do not necessarily provide independent corroboration of findings. Thus, findings of the behavioral characteristics of a suspect must not influence the selection and/or interpretation of evidence. The findings of the various disciplines have to remain with their specific methodological limitations. Table 3 summarizes the relevant literature, highlighting its contributions as well as the more or less uncertain applications.

Interviewing and Confession Evidence

Investigative interviewing, like any other piece of evidence, can be affected by a number of factors. A description of the suspect's vulnerabilities and the ways in which the investigation can increase the chance of a false confession through various interrogation methods, as described by Kassin *et al.,* [7], enables us to assess the reliability of a statement. Even apparently complete statements are not necessarily reliable, for a number of reasons. For example, their content may have been affected by factors related to the way in which the statement was obtained.

While there are limitations in the behavioral judgments of deception [9], such as nervous behavior or hesitation, unusual behavior does not necessarily mean that a person is dishonest. Rather, the goal of the interrogator is to obtain an account that can be checked for veracity rather than to give credit for confidence in their account or conformity to preconceived notions of how a guilty person would act.

Within the proposed framework, investigators have to document which information has been voluntarily given by the suspect and which information has been elicited by the investigator during the course of the interview. The agreement of a confession with case information provides weaker independent corroboration for such information as it was derived from the interview with the suspect. Recorded information pathways enable to distinguish between information provided by the suspect and information provided by other persons.

Cognitive Bias and Information Independence

In examining a case, it is equally important to scrutinize the observer as it is to study the observed. In his recent review of existing research Dror [3] explains how the main sources of bias in decision-making can be related to case-specific information as well as to the observer's experience, his working environment, and last but not least to his cognitive functioning. Although high levels of expertise can mitigate many of the flaws resulting from human functioning, the basic flaws described above are not eliminated.

In particular, one must watch out for so-called circular corroboration, *i.e.,* the initial behavioral theory that led to the suspicion may in turn have been influenced by the subsequent statements derived from the interrogations and thus have been corroborated by them. However, the fact that all contributions to this special issue seem to converge does not necessarily mean that they all stem from the same informational source (Table 4). These safeguards need to be empirically tested to determine whether they improve the accuracy of forensic investigations and reduce errors. Being formally stated as part of a procedure does not necessarily mean that they will have the required effect.

Proposed Multidisciplinary Framework

Starting from documented and provenanced observation(s), competitor explanations are developed (outlining the predictions made by each as well as the reasons why evidence contradicting said explanation would weaken it). The corresponding investigative steps and analytical procedures are then implemented to test said predictions. A third party conducts an independent review of contradictions and information dependencies in order to allow said explanations to be either added to, amended or even completely rejected as necessary in light of newly acquired data. The revision process is graphically represented in Figure 3 below.

Demanding that the psychological account identifies the disconfirming evidence in order to be modified by subsequent findings is crucial to preventing the account from being modified by subsequent findings until it can no longer be tested. The framework's primary concern is whether the selected explanation is significantly different from the alternative(s) and whether the selected findings actually answer the question(s) at hand.

For example, a break and enter where selected items have been taken and very little else disturbed could be caused by someone familiar with the premises (prior observation by the perpetrator, information supplied by another person etc.). or easily visible property left in view. The findings from access records, from any witnesses etc. and from a documented scene would help to discriminate between the various possibilities that a psychological explanation of human behavior suggests. This example is not a real case but is included to make a point.

Table 5 outlines possible indicators of success for this framework in advance, namely useful and accurate leads and appropriate handling of contradictory information. It is not sufficient if an interesting profile or convincing story has been produced.

Table 4: Reasoning risks and proposed safeguards.

Risks	Potential consequence	Proposed control
Early anchoring	Preferred theory dominates inquiry	Record alternatives before final interpretation
Context exposure	Irrelevant information shapes judgment	Document what information each contributor received
Circular corroboration	Shared information appears independent	Trace the origin of supporting claims
Interview contamination	Supplied details resemble independent knowledge	Record the interview and disclosure chronology
Narrative overreach	Compatibility is treated as proof	State the proposition actually tested

Table 5: Proposed outcomes for prospective framework evaluation.

Outcomes	Candidate measure	Interpretive requirement
Lead accuracy	Correct and incorrect leads	Use independently established outcomes
Alternative testing	Relevant alternatives examined	Assess quality rather than count alone
Revision	Changes following contradictory evidence	Document reasons for retaining or changing a view
Information independence	Exposure and disclosure records	Identify dependencies between contributions
Operational burden	Time and resources required	Compare benefit with implementation demands

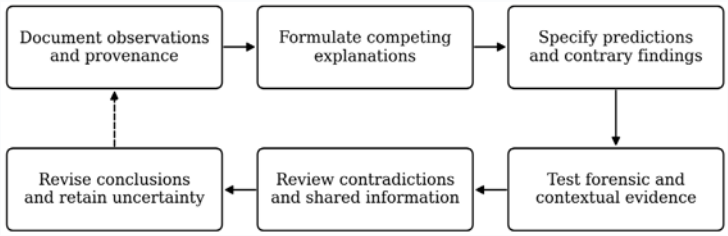


Figure 3: Proposed hypothesis testing and revision framework.

Operationalizing this new way of work would require a number of key actions, namely: establishing responsibility for documenting each stage of the process (*i.e.,* chronology, hypothesis); establishing the relevant disciplinary specialist(s) who report on the relevant findings within their area of competence; and a reviewer who scrutinizes claims against the supporting evidence for the particular investigation. All disagreements should be recorded and not dismissed within the investigation in order to identify the points where more evidence is needed and where the conclusions drawn go beyond the available evidence to support them [10].

A report of findings should make clear whether a particular piece of information supports the particular interpretation placed upon it or whether it simply is compatible with it. Much compatible information is shared by alternative interpretations. Thus, in a report of findings, it would be useful to set out the information, together with its interpretation and the alternative(s) considered, and the investigator's uncertainty left after consideration of that information. If a prediction made by an explanation fails, it should be recorded whether or not that explanation was then revised; and if not, then what other good reason there was for retaining it.

Training scenarios for the respective steps of the described process can be developed in the form of case studies. These have to be anonymous, but the same data can be accompanied by different contextual information. First the data are documented and then the possible alternative explanations for these data are worked out. After additional data have been generated the conclusions of the different participants are compared. The aim of such training is to make the transitions between the single steps as visible as possible and to train the strict revision of one's own interpretations. The transfer to operational use has to be proven with appropriate evidence that it really improves the investigator's work and that it does not require too many resources.

Limitations and Future Directions

The articles reviewed incorporated different populations, methodologies and results. As a result, it is not possible to give a single estimate of the effectiveness of multidisciplinary integration for improving the investigation of cases in order to detect and prosecute those who use violence against others. The focused nature of the search also means that there are limits to the completeness of the framework. Future studies must compare the new framework with current methods for the evaluation of investigative evidence in independent, prospectively collected cases. Such studies should measure incorrect leads as well as missed alternative suspects, and also the time needed for the review as well as the changes that result. Studies must clearly distinguish between the exploratory development of the framework and its external validation, and report all uncertain or negative results obtained with the new framework, as well as its benefits. Research on cultural applicability in specific settings, like India, is needed. Research on evidence obtained and used in different settings, taking into account language, social context, interview settings and services available, is required. Importantly, this research should not confuse demographic identity with criminal propensity.

Conclusion

The criminal mind can be examined productively when behavioral explanations remain answerable to evidence. Psychology contributes formulations, criminology situates conduct within developmental and social contexts, and forensic science tests particular propositions.

Their integration requires explicit boundaries because a profile cannot establish identity, a diagnosis can't establish guilt, and a trace association cannot independently establish motive.

This review proposes a framework centered on competing hypotheses, disconfirming predictions, documented information pathways, and revision. Its impact would depend on prospective evidence of improved decisions, not on the persuasiveness of its terminology. A rigorous investigation should preserve uncertainty where necessary and remain capable of abandoning its initial account. That capacity to revise is the defining strength of evidence guided forensic lens.

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