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Script Analysis for Security Professionals: Past, Present and Future

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Abstract

This chapter positions script analysis as a useful tool to help security practitioners design and upgrade preventive and protective controls in an organisational context. It provides a brief introduction to the script concept and its key attributes and presents the approach as a pragmatic means to analyse the process that offenders go through in the commission of a crime, to pinpoint opportunities for preventive intervention and to identify a fuller range of risk mitigating measures to choose from. In addition to providing some documented examples of how the approach has been applied in practice, it highlights some recent advances in script analysis and some suggested areas for improvement.

Introduction

Recent years have seen a growing interest in the use of script analysis for crime prevention purposes. This chapter positions the approach as a useful tool to help security practitioners develop and upgrade preventive and protective controls in reaction to real-life or improvised security incidents. It presents the use of scripts as a pragmatic means to analyse the process that offenders go through in the commission of a crime, to pinpoint opportunities for preventive intervention and to draw attention to a fuller range of risk mitigating measures.

The first part of this chapter provides a general introduction to the script concept and its key attributes, and to the way it was adopted from cognitive science in support of situational crime prevention. It sets out how scripts can operate at different levels of abstraction, how they can be developed as single-perspective or interpersonal scripts, and how script analysis can be applied in various modes to study completed, failed, aborted and imaginary crimes. It further

shows how scripts can be interpreted to develop and upgrade preventive and protective security controls, and how they enable security practitioners to uncover valuable information that may be missed during a more superficial assessment of a crime event. Part Two provides some documented examples of how the approach has been applied in practice. It shows how scripts have been created for a broad range of crime types and illustrates their relevance to contemporary security professionals. Parts three and four highlight some recent advances in script analysis and some suggested areas for improvement, respectively. The latter include proposals to develop a more structured and consistent scripting methodology, to improve the quality of modus operandi data in the information sources relied upon to generate scripts, or to broaden the theoretical base of script analysis to better support current script research and practice. The key takeaways, finally, are summarized in a general conclusion.

1. Crimes as Scripts

The script concept was first introduced to the field of environmental criminology when Derek Cornish proposed to use it in support of situational crime prevention (Cornish, 1994; Borrion, 2013; Leclerc, 2014a). For situational interventions to realize their full potential, they need to be crime-specific and thoughtful of the procedural aspects of crime commission (Cornish, 1994). Crime events form part of a chain of events, and a detailed understanding of what occurs both prior to and following the actual crime event may be of practical benefit to those tasked with designing situational measures (Cornish, 1994).

As to guide researchers and practitioners in tackling the problem of gathering and organizing information about crime commission, Cornish (1994) turned to theories and concepts developed in cognitive science where the production and understanding of sequences of events or actions was also being addressed. One such concept was the notion of the script, which featured in the debate on human memory organization. In early writings in cognitive science, scripts – as part of a family of hypothesized knowledge structures or 'schemata' (Cornish, 1994) – function as an economy measure in the storage of episodes that are alike and remembered in terms of standardized generalized episodes (Schank & Abelson, 1977). Frequently recurring social situations that involve strongly stereotyped conduct, such as a visit to a restaurant, doctor or dentist, are captured in our memory as a standard event sequence (or 'script') that can easily be recognized and recovered based on just some events that form part of its causal chain (Schank

& Abelson, 1977; Schank, 1989). Considered from the point of view of a customer, the 'restaurant script' outlines the sequence of actions that a customer must take when visiting a restaurant for a meal (e.g. 'enter', 'wait to be seated', 'get the menu', 'order', 'eat', 'get the check', 'pay' and 'exit') (Schank & Abelson, 1977; Cornish, 1994). In more general terms, a script describes the relation between 'casts' (i.e. actors or roles such as customers, waitresses and cooks), 'props' and 'locations' in a sequence of 'actions' to characterize routines occurring in specific 'scenes' (Borrion, 2013).

Crime Scripts

'A script-theoretic approach', according to Cornish (1994, 160), 'offers a way of generating, organizing and systematizing knowledge about the procedural aspects and procedural requirements of crime commission'. Applied to crime, the approach may help to uncover the complete sequence of actions adopted before, during and after a crime event; extending the analysis to all stages of the crime-commission process and drawing attention to a fuller range of possible intervention points (Cornish, 1994; Chiu et al., 2011; Leclerc & Wortley, 2014). Table 1 provides the hypothetical example of a theft from a parked, soft-sided trailer turned into a (universal) crime script. It provides detail on the offender actions prior to, during and following the actual theft, and highlights some measures that can potentially be introduced to disrupt the crime-commission process.

Table 1. Example script 'Cargo theft from a parked trailer' (modified from Haelterman, 2016)

Script Scenes	Script Actions	Situational Measures
Preparation	Steal a van or light truck to transport the loot	Car alarms, ignition locks, steering locks, immobilizers
Preparation	Gather the necessary tools for breaking into a trailer and to offload the loot into the getaway vehicle	Control markets, informal social control
Entry	Enter unsecured parking lot	Access controls, parking attendants, entry/exit screening
Pre-condition	Drive around in search for soft-sided trailers	Enhance visibility and natural surveillance, on-site patrolling, camera surveillance, raise

		awareness and informal social control
Instrumental pre-condition	Select a soft-sided trailer to hit upon	Replace soft-sided trailers with hard-sided trailers
Instrumental initiation	Close-in on selected trailer	Enhance visibility and natural surveillance, on-site patrolling, camera surveillance, raise awareness and informal social control
Instrumental actualization	Cut hole in the tarpaulin to check the load	Intrusion detection, anti-slashing strips, use secure parking facilities when transporting high-value or theft-prone goods
Instrumental actualization	Break seal/lock of the trailer back door	Intrusion alarms, security seals, security locks, park trailers back-to-back or facing a wall or fence
Doing	Offload cargo from the trailer	Enhance visibility and natural surveillance, on-site patrolling, camera surveillance, raise awareness and informal social control
Doing	Load cargo into the getaway vehicle	Idem
Exit	Leave parking lot	Exit controls, entry/exit screening
Aftermath	Sell stolen goods on the black market	Disrupt markets for stolen goods, identify products

This very basic script displays a specific type of cargo theft from a trailer at a 'track'-level and provides the appropriate level of specificity to identify specific intervention points and potential countermeasures. Related to this 'curtain-slashing' track is a 'theft from a moving vehicle' track, as outlined in Haelterman (2016). Both may be considered part of a family of 'cargo theft from a trailer' scripts, which can in turn be subsumed under the broader category of 'cargo theft' (see also Cornish, 1994).

Indeed, the script concept can operate at different levels of abstraction, ranging from 'metascripts' (e.g. theft of property) and 'protoscripts' (e.g. robbery) to very specific 'scripts' (e.g. robbery from the person) or 'tracks' (e.g. subway mugging), and more complicated crimes can be regarded as 'composite scripts that can be disaggregated into a series of linked and "nested" scripts' (Cornish, 1994, 173). Scripts can be developed from the perspective of the

offender – as is the case in our hypothetical example - or from the point of view of other actors involved during crime events, such as victims or guardians against crime (Leclerc, 2014a; Leclerc & Reynald, 2017). They can be developed as single-perspective scripts that capture the step-by-step decisions and actions of an offender, victim or crime controller; or as interpersonal scripts providing detail on the interaction between various parties involved during crime commission (Leclerc, 2014a; Leclerc, 2014b). Script analysis can be applied in a proactive, reactive or hypothetical mode to study completed, failed, aborted or imaginary crimes (Cornish, 1994; Haelterman, 2016). As will become clear from the examples provided in Part Two, it can be applied to a wide variety of crime types, ranging from simple to more complex forms of crime.

The Routinized yet Flexible Nature of Crime Scripts

While scripts can be characterized as routinized plans, they should not be considered 'necessarily rigid, stereotyped sequences of actions' (Abelson, 1981; in Cornish, 1994, 171). Changes in the environment will cause event schemata - like scripts - to elaborate and change, and offense scripts typically operate in a hostile environment (Cornish, 1994). The conflictual nature of crime, according to Ekblom & Gill (2016, 333), 'renders it likely that during many performances, plans must be adapted and revised, and new scripts invented or recruited through improvisation, on each occasion'. Offenders may be confronted with sudden obstacles, forcing them to abandon the planned action altogether, to move to an alternative script or to improvise and decide on an innovative course of action. They may also be confronted with opportunities, encouraging them to deviate from the activated script. Crime scripts are inherently flexible and tailored towards overcoming obstacles and embracing opportunities (see also Cornish, 1994; Chui et al., 2011). Scripts of experienced offenders, according to Cornish (1994, 172), 'are likely to be structured in ways which allow for the choice of rapid alternative responses in reaction to the range of unwanted but foreseeable contingencies specific to the crime-commission track in question'. Those of beginning or occasional offenders, in contrast, will probably be less articulated (Cornish, 1994). As Tremblay et al. (2001, 562) put it, 'the reasoning criminal learns by doing, and script elaborations are precisely what such learning is about'.

Scripting Preventive and Protective Security Controls

One of the key benefits of script analysis is its potential to guide preventive intervention. Thinking of crime commission in terms of scripts offers a way of examining the crime-commission process in full detail, from start to finish. The script template 'gives new opportunities […] for understanding the step-by-step process that offenders have to go through in the commission of any crimes', for getting closer to the crime scene and for identifying additional intervention points for situational prevention (Leclerc & Wortley, 2014, 6). It helps to identify blind spots and provides guidance on where to 'map' preventive measures onto the crime-commission process to develop more robust and effective controls (Cornish, 1994; Samonas, 2013; Leclerc & Wortley, 2014). Presenting crime commission in a script format enables security practitioners to think of potential controls or control improvements for each script action, leading to a broader inventory of candidate solutions to avoid (repeat) victimization and allowing them to make an informed decision on what measures best to implement within a given context (see also Haelterman, 2011 for further guidance on selecting the most promising situational measures). This may be useful to traditional security departments tackling property crime, workplace violence or organized crime; and to information security professionals tackling all sorts of high-tech crimes (see also Warren et al., 2017). By providing a framework to examine alternative pathways that offenders might follow when confronted with obstacles during crime commission, it further provides designers of preventive measures with a means to anticipate displacement and other reverse effects (Gill, 2016; Haelterman, 2016).

2. Documented Practice

Based on a systematic review of over 100 scripts published between 1994 and 2018, Dehghanniri & Borrion (2019) provide a comprehensive picture of scripting practices covering eight broad crime categories: cybercrime (e.g. attacks on online banking), corruption and fraud offences (e.g. expense reimbursement fraud), robbery and theft offences (e.g. armed robbery, car theft and pickpocketing), sexual offences (e.g. child sex trafficking), violent crime (e.g. hostage taking and foreign fighting), drugs offences (e.g. open-air drug selling), environmental crime (e.g. illegal waste dumping and wildlife trafficking) and a rest category containing crime

types not previously covered. More recent examples include the use of script analysis – or a reference thereto - to study:

- drug trafficking (Luong, 2019; Staring et al., 2019);
- the hunting of jaguars and the production of jaguar paste (Lemieux & Bruschi, 2019);
- antiquities trafficking (Weirich, 2019);
- sexual offences committed on public transport (Apena Rogers, 2019);
- poppy cultivation and opium production (Chainey & Guererro, 2019);
- sexual assault (Chopin et al., 2019);
- the advertisement and delivery of counterfeit documents on the Internet (Holt & Lee, 2020);
- ideologically motivated vehicle ramming attacks (Williams et al., 2020);
- Nigerian piracy (Peters, 2020);
- the illegal harvesting of live corals (Sosnowski et al., 2020);
- unattended package theft (Stickle et al., 2020);
- school shootings (Keatley et al., 2020);
- website hacking attacks (Leppänen et al., 2020);
- illicit waste trafficking (Andreatta & Favarin, 2020);
- corporate benchmark-rigging in the financial services industry (Jordanoska & Lord, 2020);
- the illegal trade of medicines (Baratto, 2020);
- illegal fishing (Weekers, 2020);
- and a wide variety of fraud schemes (see e.g. Hutchings & Pastrana, 2019; Hardy et al., 2020; Junger et al., 2020).

The list goes on and confirms that script analysis continues to grow in popularity. Based on some random examples of documented practices, the following sections further illustrate the relevance of the approach to contemporary security professionals. The examples show how crime scripts have been built upon to design and prioritize preventive interventions, to assess the effectiveness of existing controls, or to guide the design of internal security processes.

Cybercrime

In the literature review conducted by Dehghanniri & Borrion (2019), cybercrime tops the list of most prevalent crime type categories. Back in 2005, Willison reported on the use of script analysis to study (employee) computer crime. A fraud committed by a dishonest local council employee who created and authorized fictitious invoices was turned into a crime script and led to the identification of various preventive controls ranging from pre-employment screening to segregation of duties and improved access controls (Willison, 2005; Willison & Siponen, 2009). Applying the script methodology, according to Willison (2005), helps to draw attention to all procedural aspects of (employee) computer crime, to the attributes required to commit the offence, and to ways of denying access to such attributes. It further helps to ensure making optimum use of available safeguards and 'allows consideration of the interrelationship between the security behavior of staff, safeguards, and the criminal behavior of dishonest employees' (Willison & Siponen, 2009, 136). Basamanowicz & Bouchard (2011) applied the script approach to identify structural weaknesses in the process of acquiring and distributing copyrighted content on the Internet, and to direct law enforcement agencies' attention to those process steps that have the greatest potential for disrupting the online piracy scene. Based on a script of the so-called 'warez release process', it was recommended for industry to modify existing digital rights management technologies and for law enforcement to focus investigative efforts on apprehending those individuals capable of stripping content of its copyright protections on behalf of the most prolific release groups (Basamanowicz & Bouchard, 2011). Lavorgna (2013) turned to script analysis to identify and classify the criminal opportunities provided by the Internet for carrying out a variety of transit crimes, and Leukfeldt (2014) applied the script framework to describe the steps undertaken by a criminal group to approach potential victims, lure them to a phishing website, obtain their account details and transaction codes, and transfer money from their accounts (Leukfeldt, 2014). This latter exercise led to the identification of various opportunities for situational interventions such as setting up awareness campaigns to alert potential victims or upgrading security controls applicable to call center employees in major banks (Leukfeldt, 2014). The script format has further been applied to guide the design of methodologies for performing penetration tests on IT systems (Dimkov et al., 2010) and to identify security loopholes in the information security setup of an upper-tier budget hotel in London (Samonas, 2013).

Corruption and Fraud Offences

In previous work I produced multiple offender – and interpersonal scripts relating to expense reimbursement fraud, fraudulent cash withdrawals, fraudulent money transfers and 'CEO-fraud' (see also Haelterman, 2016). Based on these scripts, a variety of situational controls or control improvements were identified and assessed, ranging from the introduction of security hardware and awareness training to procedural improvements and the implementation of second level controls (Haelterman, 2016). Other authors have applied the script framework to study corruption in public procurement, the distribution of counterfeit products, occupational counterfeiting schemes and the trade in fraudulently obtained airline tickets, to name a few.

Zanella (2014) applied the script framework to delve into event decisions of corrupt agents involved in public procurement of works contracts. The author uncovered the key stages involved in the type of corruption in scope to then focus on the procedural aspects and procedural requirements of the crime from the perspective of the offender (Zanella, 2014). This analysis, according to Zanella (2014), provides scope for situational interventions in the interest of law enforcement, public administrations and private enterprises. Lord et al. (2017) presented a script analysis of a counterfeit alcohol distribution network across two European jurisdictions, revealing five key script scenes following production, concealment and initial storage of the counterfeit product (Lord et al., 2017). While this exercise was primarily aimed at informing the enforcement response of responsible regulators, it can equally be benefitted from in a commercial setting to guide the intervention and disruption strategies of corporate security departments. Building on the work of Lavorgna (2015), Kennedy et al. (2018) developed a crime script for pharmaceutical counterfeiting schemes perpetrated by licensed health care professionals under the guise of legitimate health care practices. Based on an analysis of 30 U.S. counterfeiting schemes captured from an open-source product counterfeiting database, they were able to identify various opportunities for intervention such as the implementation of coordinated recordkeeping systems that link manufacturer, wholesaler and health care provider records in a way that allows for automated detection of particular anomalies (Kennedy et al., 2018). Hutchings (2018), as a final example, turned to script analysis to provide an overview of the trade in fraudulently obtained airline tickets, leading to a better understanding of the phenomenon and to the identification of various opportunities for intervention (Hutchings, 2018). This study further revealed evidence of displacement, illustrating the value of script

analysis for examining alternative pathways that offenders may follow when confronted with obstacles during crime commission (Hutchings, 2018).

Robbery and Theft Offences

Examples of robbery and theft offences for which scripts have been created include metal theft from a railway network (Ashby, 2016), cargo theft from a moving vehicle (Haelterman, 2016), armed robbery and serial robbery crimes (Borrion et al., 2017; Li & Qi, 2019), and unattended package theft (Stickle et al., 2020).

In his article on Nigerian piracy, Peters (2020) applied the script framework to examine four types of maritime piracy: robberies, ship/cargo seizures, kidnappings for ransom, and attempted boardings/unspecified attacks. This exercise led to distinct business models for each piracy-type, illustrating the need to be crime specific and to tailor preventive interventions to the unique characteristics of each sub-type (Peters, 2020). Also worthy of attention is the work conducted by Lasky et al. (2015) who applied a script like approach to examine how shoplifters convey impressions of normalcy while inside a store. Based on interviews conducted with 39 active offenders immediately after they had simulated shoplifting while wearing an eye-tracking device to record their actions and behaviours, the shoplifting journey was captured in three distinct stages (Lasky et al., 2015). With the video footage serving as memory prompts, valuable insight was obtained about the offenders' decision making while navigating the store in search for items to steal, and about their use of different types of body gloss during their journey (Lasky et al., 2015). Same as the study conducted by Samonas (2013), this latter study illustrates how the use of script analysis extends beyond studying completed, failed or aborted crimes.

Violent Crime

The script-theoretic framework has further been used to examine a variety of violent crimes, some of them of relevance to contemporary security professionals. Meyer (2012), for example, made use of crime scripts to provide advice on how to prioritize protective security measures against explosive attacks on railways. More recently, Osborne & Capellan (2017) turned to script analysis to examine event-level characteristics of active shooter events and to develop

strategies to reduce their occurrence and/or lethality. The latter include crime stage specific and script specific strategies and techniques such as training and awareness building (e.g. on how to recognize and report behavioural or verbal 'red flags'), gun control, controlling access to facilities and formal surveillance (Osborne & Capellan, 2017).

This non-exhaustive overview of scripting practices shows how performed and planned scripts have been created for a variety of issues facing commercial organizations. It also sheds light on the data sources used for generating crime scripts. Some analysts make use of offender accounts of crime commission (see e.g. Lasky et al., 2015). Others turn to secondary sources of data - or combinations thereof - such as audit reports (e.g. Willison, 2005), court data (e.g. Basamanowicz & Bouchard, 2011; Zanella, 2014), police files and data sets (e.g. Leukfeldt, 2014; Ashby, 2016), self-reported victimization data (e.g. Peters, 2020; Junger et al., 2020), open-source databases (e.g. Kennedy et al., 2018), interviews with subject matter experts and field practitioners (e.g. Lavorgna, 2013; Haelterman, 2016; Hutchings, 2018) and video footage (e.g. Borrion et al., 2017; Stickle et al., 2020). Of the 60 scripts that were selected by Dehghanniri & Borrion as containing non-ambiguous information about the data sources used to generate the scripts, 29 scripts were created using a mix of primary and secondary data, and 23 scripts were created using just secondary data (Dehghanniri & Borrion, 2019).

3. Recent Advances in Script Analysis

The practical utility of script analysis extends beyond providing security practitioners with a means to break down the crime-commission process to introduce new or improved security controls. The technique offers possibilities for anticipating crime displacement and diffusion of benefits, for detecting trends and targeting often recurring modi operandi, for identifying serial crimes and - offenders, and for developing security products, systems and training programs (see also Haelterman, 2016). The manifestation of these benefits comes gradually and piecemeal but confirms the status of script analysis as an indispensable tool for years to come. Evidence of this huge potential is the work that has already been done to extend its reach beyond its initial applications. Apart from adapting, streamlining or simplifying the structure of crime scripts to improve their practical utility or to tailor them to the study of specific crime phenomena (see e.g. Hancock & Laycock, 2010; Tompson & Chainey, 2011), some have extended the boundaries of script analysis beyond the use of offender scripts (see e.g. Leclerc,

2014a on generating scripts from a victim perspective, Leclerc, 2014a-b and Leclerc & Reynald, 2017 on the use of scripts to display the intervention process of crime controllers, and Leclerc, 2014a on relational schemas and the development of interpersonal scripts). Others – as will show from the next section – have tried to boost the value of script analysis through combining it with other methods of analysis.

Combining Methods

Various researchers have combined script analysis with social network analysis to gain a more comprehensive understanding of the structure and functioning of criminal networks. According to Morselli & Roy (2008, 71-72), merging both methods of analysis allows researchers 'to reconfigure criminal ventures […] in a framework that represents both the criminal decision-making process (crime script) and the structure embedding it (social network)'. Morselli & Roy (2008) applied the combined method to investigate the role of brokers in vehicle ringing operations. In their analysis of a counterfeit alcohol distribution network, Lord et al. (2017) did so to better understand the distribution of illicit alcohol from one jurisdiction to another, to identify the processes and behaviours involved, and to describe the roles that specific actors play at different stages of crime commission. For the purpose of their study, according to Lord et al. (2017, 268), 'a social network analysis approach complements the script analysis by providing the analytical tools to understand how […] actors are embedded in the structure of distributing counterfeit alcohol, some occupying central positions, while others being more peripheral'. Others have combined script analysis and social network analysis to study the trade in converted firearms (De Vries, 2012), to highlight structural and functional changes in a drug trafficking network across time (Bright & Delaney, 2013), or to inform counter terrorism disruption strategies (Masys, 2016).

4. Future Development Needs

The growing popularity and extended use of crime scripts also comes with frequent calls for improvement. Some authors have expressed the need for a more structured and consistent scripting methodology. Others advocate the need to improve the quality of modus operandi data

feeding into the script template, or to broaden the theoretical base of script analysis to better support future research and practice.

The Need for a More Structured Scripting Methodology

The lack of an agreed method and criteria to compare different scripts representing the same crime event, poor guidance on script verification and validation, and concerns about a potential mismatch between designer needs and current scripting practices led Borrion (2013) to define twelve quality criteria that could be used to evaluate crime scripts and to improve their utility for the design and development of effective control measures. More recently, Borrion et al. (2017) invited 21 students to create a script based on the same video footage of a shop robbery. This exploratory study revealed that scripts developed from the same data by several individuals who received the same training can greatly vary, leading the researcher to conclude that 'different scripters create different scripts' (Borrion et al., 2017, 119). Variations were found in the scope of the scripts; the number of steps, activities and components identified; and the level of detail provided (Borrion et al., 2017). Based on these observations, the authors recommend creating 'a more systematic and goal-based crime scripting technique that could outperform the current intuitive approach and reduce the observed variance in quality' (Borrion et al., 2017, 121).

'Garbage in, Garbage out'

Having accurate data to work from is essential for creating meaningful scripts. In order to generate a script, according to Tompson & Chainey (2011, 186), 'one needs to consider or gather information on how the offender went about the crime commission, and the rational (or otherwise) choices that were made by the offender'. This includes detail on the chronology of events, on all actors and effort involved, on their goals and sub-goals, on the skills and expertise required to carry out each step in the process, on the tools and circumstances facilitating crime commission, etc. (see also Tompson & Chainey, 2011; Haelterman, 2016). In practice, however, 'crime scripts suffer from fragmented information and an impermanency of many activities' (Gilmour, 2014, 39). Some script stages or actions may be overlooked due to missing data in the source materials available to analysts, or some may be better articulated (and

understood) than others (Cornish, 1994; Tompson & Chainey, 2011). Defining the type of qualitative data that needs to be recorded for creating quality scripts is therefore considered an important point of improvement (Tompson & Chainey, 2011) and a prerequisite for adopting some of the more automated forms of data gathering and - analysis that are currently being developed (see e.g. Li & Qi, 2019 on a novel way of detecting serial crimes based on crime commission details).

Theoretical Considerations

In addition to the more technical and methodological concerns that were raised in the previous sections, some authors have challenged the theoretical base of script analysis as it was first introduced to the criminological domain. Tompson & Chainey (2011), for example, point to the fact that some may consider the interdependency between script analysis and the rational choice perspective to be inhibitive, and argue that other decision-making frameworks can be relied upon where there is a robust justification for doing so. 'As long as a decision-making framework facilitates the social, legal and situational variables influencing action to be identified', according to Tompson & Chainey (2011, 186), 'it is unimportant which framework is used to create crime scripts'.

Other authors present a more extensive case for re-thinking the theoretical foundations of script-based modus operandi research. The conceptual foundation imported from cognitive science, according to Ekblom & Gill (2016, 319-321), was 'unclear and too narrow a platform to support the current scope of script research', which led them to search for conceptual clarity 'to better connect the scripts concept to mainstream situational crime prevention and criminology more generally', and 'to broaden the approach by exploring additional cross-disciplinary links'. Ekblom & Gill (2016, 323) define scripts as 'abstracted descriptions of structured sequences of behaviour extended over time and perhaps space, which could be considered functionally self-contained units or subunits of longer sequences'. Borrowing from ethology and behavioural ecology, they further distinguish between empirical and explanatory scripts. The first are referred to as 'simple descriptions of recurrent sequences of behaviour in situ' (Ekblom & Gill, 2016, 324). At a minimum, they can be described as 'bare abstracted sequences of actions or associated events', but while studying variation in behaviour across agents and/or situations 'may suffice for guiding criminal investigation', it is believed to be of limited preventive (and

academic) use (Ekblom & Gill, 2016, 324). The functional explanation provided by procedural scripts, in contrast, is considered of great importance to (situational) prevention, as are combining functional and causal perspectives in scripts (according to circumstance) and understanding script clashes and – collaborations (Ekblom & Gill, 2016). Differentiating between behaviour and events, leveraging from other disciplines to distinguish the levels of explanation needed to handle sequences of purposive behaviour, linking functional and causal perspectives in scripts, distinguishing competence from performance, highlighting the difference between empirical and procedural scripts (and their usefulness for crime prevention purposes), relating script analysis to other theories and approaches that focus on criminal events, extending the scope of scripts in general and emphasizing the importance of script clashes and collaborative scripts, according to Ekblom & Gill (2016, 335-336), may provide 'a better definition of a script and its multiple features'. Eventually, it may also yield significant practical advantage (Ekblom & Gill, 2016).

5. Conclusion

Covering the full history, theoretical foundations, past and current applications, strengths, weaknesses and future possibilities of script analysis in a single chapter is an impossible task. This contribution therefore focuses on the value of the approach to contemporary security professionals. It provides a very brief introduction to the script concept and its key attributes, and goes on to show how crime scripts can be built upon to design and prioritize preventive interventions, to assess the effectiveness of preventive and protective controls, and to guide the design of internal processes. It further shows how script analysis can be combined with other methods of analysis to extend its scope and increase its usefulness.

Thinking of crime commission in terms of scripts offers a way of examining the crime-commission process in greater detail, from start to finish, which opens possibilities for identifying a fuller range of risk mitigating measures and to pinpoint these to the most promising intervention points. It further provides designers of preventive and protective security measures with a means to anticipate displacement and other reverse effects, and to benefit from potential diffusion of benefits.

Getting the approach to reach its full potential is work in progress. The appropriate level of formalization and standardization that is required for creating scientifically robust scripts that

remain fit for practice is still to be determined, and will need to balance the pros and cons of providing freedom versus imposing a more structured scripting methodology (see also Dehghanniri & Borrion, 2019). Also of concern are the availability, completeness and accuracy of data required for creating meaningful and quality scripts. Where offenders' accounts of crime commission are obtained as a primary source of information, active probing and the adoption of interviewing techniques that are fit for purpose may be required (Cornish, 1994). Where secondary sources are used, it is important to acknowledge potential deficiencies. Data retrieved from incident reports, for example, may be subject to inaccuracies 'ranging from simple recording and data entry errors to the purposeful withholding of pertinent incident details by reporting parties' (Peters, 2020, 5). Meeting these and other development needs referred to in this chapter - be it of a methodological, administrative or more conceptual nature - will turn script analysis into a standard ingredient of the security manager's toolbox, and rightly so.

Recommended Readings

Cornish's seminal article on *the procedural analysis of offending and its relevance for situational prevention* (1994) is considered a key reference and required reading for anyone who wants to learn about the use of scripts to study crime-commission processes. Also worthy of attention is the work of Leclerc (2014a) who argues that the approach should also be applied to victims and guardians against crime and to guide the analysis of the interchange between actors involved in the crime event. Dehghanniri & Borrion (2019) provide a comprehensive overview of crime scripting practices based on a systematic review of over 100 scripts published between 1994 and 2018. In an earlier contribution, Borrion (2013, 9) presents a list of quality criteria that could be used to evaluate crime scripts, and a checklist 'to support the specification, verification and validation of functional requirements for control measures'. The work of Tompson & Chainey (2011) illustrates how crime scripts can be used to understand specific crime phenomena (in casu illegal waste activity). It further provides some good insights into relevant data requirements and into the types of issues faced when trying to gather useful data. Ekblom & Gill (2016), finally, present an interesting rewrite of the script concept to better support future research and practice.

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Short Bio

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