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UK-based terrorists' antecedent behavior: A spatial and temporal analysis

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ABSTRACT

Background and purpose: Terrorism is a real and present danger. The build-up to an attack includes planning, travel, and reconnaissance which necessarily require the offender to move through their environment. Whilst research has examined patterns of terrorist attack locations, with a few exceptions (e.g. Rossmo & Harries, 2011), it has not examined the spatial behavior of the terrorists themselves. In this paper, we investigate whether the spatial mobility patterns of terrorists resemble those of criminals (and the wider population) and if these change in the run up to their attacks.

Method: Using mobile phone data records for the ringleaders of four different UK-based terrorist plots in the months leading up to their attacks, we examine the frequency with which terrorists visit different locations, how far they travel from key anchor points such as their home, the distance between sequential cell-site hits and how their range of movement varies as the planned time to attack approaches.

Conclusions: Like the wider population (and criminals), the sample of terrorists examined exhibited predictable patterns of spatial behavior. Most movements were close to their home location or safe house, and they visited a relatively small number of locations most of the time. Disaggregating these patterns over time provided mixed evidence regarding the way in which their spatial activity changed as the time to the planned attack approached. The findings are interpreted in terms of how they inform criminological understanding of the spatial behavior of terrorists, and the implications for law enforcement.

1. Introduction

Terrorism occupies a prominent position in a long list of security threats – from climate change to global pandemics to energy shortages – that the world confronts in the twenty-first century. In recent years, it has been Islamist extremism which has represented the major area of concern to the West. Various definitions of terrorism exist, with most emphasizing a reliance on violence in order to further a political goal (Crenshaw, 1992). Yet a terrorist plot is more than just the violent act that is its embodiment, or the motivations of the perpetrators. The practical precursor steps which take place as a plot progresses – training, meetings, securing a safe house, procurement of materials and reconnaissance – take time to plan, and just like everyone else "terrorists operate within the constraints and boundaries of both time and space" (Smith, Cothren, Roberts, & Damphousse, 2008, p. 43).

Accordingly, understanding the antecedent behavior of terrorists prior to an intended attack has received increasing attention in recent years. In the context of studies of environmental criminology, this has included studying the steps that must be taken for a terrorist act to occur (Clarke & Newman, 2006). The aim of the current study is to contribute to this literature by examining terrorist patterns of spatial activity during the antecedent phases of the plots with which they were involved. Our intention is to determine whether regularities in their movement exist and whether these resemble those of the wider public or offenders engaged in urban crime. Whilst such patterns have been examined before, much of the research has tended to be anecdotal in nature (Post, Sprinzak, & Denny, 2003), largely due to the difficulties associated with obtaining the necessary data. Where empirical analyses have been conducted (see below), these have tended to be limited to examining the location of terrorists' home and attack locations. In contrast, in what follows we present an analysis of day-by-day patterns of movements – estimated using data from mobile phone data - for the Emirs (leaders) involved in four UK-based

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Islamist terrorists' plots in the run up to their attacks. All four plots involved bomb attacks against the UK in the last fifteen years - in three cases, attacks were carried out, while the fourth was disrupted by the police during the final stages of planning. As discussed below, we argue that just like everyone else, terrorists – such as those studied here - are subject to constraints that limit their movement potential, which leads to predictable patterns of activity.

The rest of the paper is organized as follows. In the next section, we discuss movement patterns of the public in general. This is followed by a review of the existing literature on the mobility patterns of urban criminals and terrorists, which informs a set of hypotheses that are tested in subsequent sections. The data and our analytic strategy are then described, along with the results generated. The paper concludes with a discussion of the findings and their implications for policing and criminological understanding.

1.1. Literature review

A natural starting point for this study concerns the spatial activity patterns of the wider population, and those engaged in forms of criminal behavior. A brief discussion of the movement patterns of such actors is useful insofar as it helps to establish what might be expected, and what might represent points of departure in signatures of the spatial behavior of terrorists. Until very recently, establishing what normal patterns of movement are has proved surprisingly difficult to answer, with Gonzalez, Hidalgo, and Barabási (2008, p.779) stating that "our understanding of the basic laws governing human motion remains limited owing to the lack of tools to monitor the time-resolved location of individuals".

As noted by Shoval and Isaacson (2006), research into human spatial behavior has traditionally relied on self-reported data collected using space-time budget diaries. This technique is used in the UK National Travel Survey conducted by the Department of Transport to examine the movement patterns of the public. Analyses of these data (Department for Transport, 2015) reveal regularities in spatial behavior, with there being (for example) a clear pattern of distance-decay, whereby shorter trips are more common than are longer ones (e.g. around 65% of trips are under 7.5 kms).

More recent work has taken advantage of data collected through ubiquitous mobile devices. For example, using mobile phone data, Gonzalez et al. (2008) tracked the movements of 100,000 anonymous individuals over a period of six months. A key finding was that while some trips covered long distances, most were short. Moreover, people's activity patterns were generally predictable, with most making regular trips to the same areas over time. In fact, on average, those sampled were to be found at their two most frequently visited locations about forty-percent of the time (and the four most visited locations around 60% of the time). In a further study, using data from 10 million mobile phone users collected over a 14-week period, Song, Qu, Blumm, and Barabási (2010) found similar results but with a slightly higher degree of predictability, with those sampled visiting their top two locations about 60% of the time (and the four most visited locations 70% of the time). In both studies, other locations were visited but with a diminishing probability. Collectively, these studies suggest that people have routine activity spaces (likely anchored around their home and other nodes of activity); that most of their activity occurs at these locations or nearby; and that the individual segments of their daily trips tend to be short. Simply put, people do not move about randomly.

1.2. Offender spatial behavior

Research concerned with terrorist spatial mobility (discussed further below) is relatively limited. In contrast, that concerned with the spatial behavior of offenders engaged in urban crime (e.g. burglary) is much more developed and this will now be discussed as a way of framing what follows. In doing so, following Rossmo and Harries (2011) we make the assumption that an understanding of the spatial behavior of offenders (one form of law breaking at odds with social norms) can inform understanding of that for terrorists (another form of law breaking also at odds with social norms). Obvious objections to this are that while criminal activity might be seen to be rational in nature, terrorist activity, which often involves the risk of death in the pursuit of a perhaps unattainable goal, seems inherently irrational. Moreover, while urban crime is often financially motivated, terrorist activity is generally ideologically-driven. In relation to the first point, it is worth noting that many have argued that urban criminals do not always act rationally (e.g. Wright, Brookman, & Bennett, 2006), and most scholars (Cornish & Clarke, 1986; Bennett & Wright, 1984; Cromwell, Olsen, & Avary, 1991) that do argue that offender decision making is rational, assume that it is boundedly so. That is, that offenders seek to maximize the benefit of their activity whilst minimizing the effort and risks involved, but do so on the basis of incomplete and often biased information. Moreover, they are assumed to use heuristic styles of thinking (Simon, 1978) rather than carefully evaluating the costs and benefits of action alternatives. This is a far cry from the classic economic model (Becker, 1968) of the rational decision maker invoked by many.

As to the differences in objectives of urban criminals and terrorists, not only does a Darwinist perspective see no contradiction in altruistically risking one's life for the benefit of one's kin (Dawkins, 2006), terrorism, being goal-driven, is not inherently mindless or irrational (Roach, Ekblom, & Flynn, 2005, p. 7). Indeed, Ruby (2002, p. 15) suggests that "terrorism is perpetrated by rational, lucid people" and there seems no reason why actions in pursuit of these goals should not also be rational (see also Cothren, Smith, Roberts, & Damphousse, 2008; Townsley, Johnson, & Ratcliffe, 2008).

Considering the movement patterns of offenders, crime pattern theory (e.g. Brantingham & Brantingham, 1993) suggests that just like everyone else, offenders have routine activity spaces that are shaped by the locations of key activity nodes and anchor points (such as their home) and the routes between them. Furthermore, that most of the activities they engage in, including crime, will take place within these spaces, since familiarity reduces uncertainty as to the likely outcome of a given action (e.g. Beavon, Brantingham, & Brantingham, 1994). A large and expanding body of empirical research provides support for crime pattern theory, demonstrating (for example) that most crimes are committed near to an offender's current (e.g. Townsley & Sidebottom, 2010; Bernasco & Nieuwbeerta, 2005; Rengert & Wasilchick, 2000; and for a recent review, see; Frith, Johnson, & Fry, 2017) or previous home locations (Bernasco, 2010), or near to other activity nodes such as their friends' homes (e.g. Rengert & Wasilchick, 2000; Wiles & Costello, 2000). However, it is important to note that the distances offenders travel varies both between offenders and type of crime. For example, relative to their older counterparts, juvenile offenders are generally found to travel shorter distances to engage in crime. That said, changes in the journey to crime do not change linearly with age. That is, the distances travelled to offend initially increase with age, but peak in the offender's early 20's, declining thereafter (Andresen, Frank, & Felson, 2014). With respect to offense types, Rossmo (1999) reports that crimes which are violent in nature (e.g. manslaughter and assault) tend to occur closer to the offender's home than do other forms of offending, such as property crime and burglary.

Like the space-time budget studies employed in transport