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Geographic patterns of diffusion in the 2011 London riots☆

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A B S T R A C T

Surprisingly little research has examined the localised diffusion of riots within cities. In this paper, we investigate such patterns during the 2011 London riots, and consider how they changed as police numbers increased. Understanding how offences spread in space and time can provide insights regarding the mechanisms of contagion, and of the risk of events spreading between contiguous areas. Using spatial–temporal grids of varying resolution, and a Monte Carlo simulation, we compare observed patterns with those expected assuming the timing and location of events are independent. In particular, we differentiate between four space–time signatures: "flashpoints" of disorder which appear out of nowhere, "containment" whereby already affected areas experience further events, "escalation" whereby rioting continues in affected areas and spreads to those nearby, and "relocation" whereby the disorder moves from one locality to those adjacent. During the first half of the disorder, fewer counts of relocation diffusion were observed than expected, but patterns of containment, escalation, and flashpoints were all more prominent. For the second half of the disorder, when police capacity increased roughly three-fold, observed patterns did not differ from expectation. Our results show support for theories of spatial contagion, and suggest that there was a degree of coordination amongst rioters. They also show that police activity did not just suppress rioting, but dampened the influence of contagion, without displacement.

Introduction

Outbreaks of rioting and civil disorder, in which groups commit acts of violence against people and property, can be devastating to local communities. The riots that affected London across five days in August 2011 resulted in excess of £200 million of damage to public and private property, over two hundred injuries to police, and two deaths (Riots Communities and Victims Panel, 2011). However, this sustained period of unrest was not equally damaging to all neighbourhoods. Rather, some locations experienced high levels of violence; whilst others, some of which were nearby, experienced few or no events associated with the disorder. Several geographically distinct areas, such as Hackney, Brixton, and Croydon, experienced large-scale violence, looting, and arson; whereas some of the areas in between—including Central London, Shepherd's Bush, and Leyton—experienced comparatively few events. Fig. 1 shows the spatial distribution of the rioting in Greater London over the duration of the disorder.

It has since been shown that the spatial patterns of offences in London are unlikely to be explained by a completely random selection process on the part of rioters: events clustered in space, and did so more than would be expected assuming a simple Poisson process (Baudains, Braithwaite, & Johnson, 2013a). Moreover, research suggests that theories developed to explain offender spatial decision-making for everyday crimes (Brantingham & Brantingham, 1993) explain rioters' target selection and decision-making rather well, with offenders, for example, targeting areas close to their home location, those that were most accessible to them via public transport, and those that were less likely to house cohesive communities (Baudains, Braithwaite, & Johnson, 2013b). Research also suggests that, on the time-scale of days, and at the large area level, areas that experienced disorder on one day were more likely to experience it on the next (Baudains et al., 2013a, 2013b). The precise space–time dynamics of the disorder and how it might have evolved, however, is not currently well

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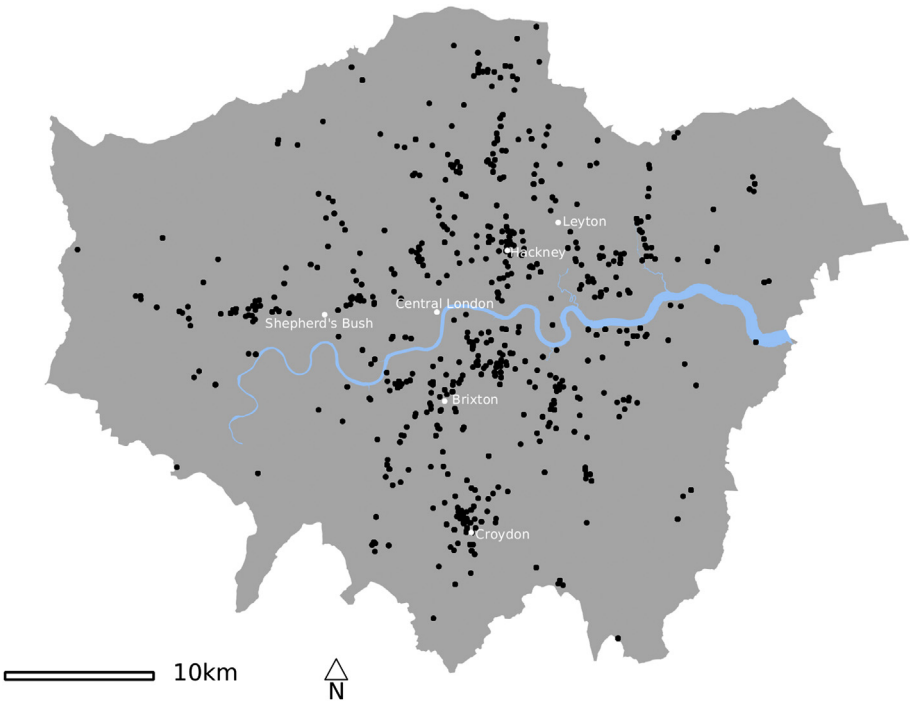

Fig. 1. The spatial distribution of riot-related offences over the duration of disorder in Greater London.

understood, particularly at finer spatial and temporal scales – scales at which the police and others might intervene to suppress the disorder. In fact, few empirical studies have examined localised space–time patterns of offences observed during outbreaks of rioting. Analysis into the diffusion of offences—which can be thought of generally as spatial–temporal emergence, growth and spreading of outbreaks of rioting in space over time—could provide valuable insights into how riots may evolve: insights that would be of value to scholars and the police alike. Several studies have identified space–time clustering in patterns of different types of offences, many of which emphasise the importance of fine-grained data analysis as a means of setting policing priorities (Johnson & Bowers, 2004; Song & Liu, 2013; Wu, Ye, & Webb, 2012). Using a computational approach, in this paper, we characterise the spatial diffusion patterns observed during the 2011 London riots to estimate if and how the disorder spread through space and time, and how such patterns might have changed as the disorder—and the police response to it—continued. In what follows, we articulate expectations as to why and how we would expect the disorder associated with riots to diffuse in space and time before proceeding to test hypotheses.

Social and geographic contagion

Riots involve groups of people at a given location engaging in or threatening acts of violence often for a common purpose. As was the case for the 2011 UK riots, an outbreak of rioting may be followed by other riots, possibly in distinct geographical areas and they can persist over a prolonged period. Riots can spread as a result of a number of processes. For example, large-scale outbreaks of disorder may be consequences of underlying tensions and grievances within a widely distributed population. If news of an initial riot at a given location spreads, then others who share similar grievances, regardless of where they are, may be inspired to behave similarly in an effort to address their grievances. Such a process of social contagion has been offered as one explanation for the severe escalation and perseverance of the patterns of offending observed during the riots in London (Gross, 2011). In particular, news reports and social media have been suggested as a source of encouragement for offenders to engage in disorder at particular locations and at particular times.

Alternatively, geographic contagion may be expected during a riot if an offender's decision to engage in the disorder is influenced by situational precipitators (Wortley, 2008). That is, rioting may prompt, permit, pressure or provoke further offences at a particular location, as bystanders perceive that engaging in the disorder at that location is acceptable, given the circumstances. If it is perceived that the risks of apprehension are lower than they otherwise would be, bystanders may be encouraged to engage in the disorder themselves, leading to further offences nearby (a mechanism explored further in Granovetter (1978) and Epstein (2002), amongst others).

While processes of contagion of both a geographic and non-geographic nature have been discussed in the literature, only a limited number of empirical studies have examined space–time patterns of offending during outbreaks of rioting. In a seminal study of the US race riots in the 1960s, Spilerman (1970) tested for the presence of geographic contagion by examining the extent to which cities were more or less likely to experience riots if those nearby had recently experienced them. Finding no significant effect, he argued that widespread riots might have been stimulated by the sharing of grievances facilitated by national news coverage of injustices on television. Subsequent studies using more precise methods and data have, however, shown that collective violence may diffuse geographically at the spatial scale of cities and on the time scale of days, but have also provided evidence to suggest that contagion is more likely in cities where news outlets such as television provide coverage of disorders occurring elsewhere (Midlarsky, 1978; Myers, 1997, 2000, 2010).

While it can be difficult to disentangle these effects, it is possible to identify particular space–time patterns of events that would be