Belfast Pathways: Space-Time Analysis of Everyday Activities in a Segregated Environment

J.D. Whyatt, G. Davies[*1], J.J. Huck[†2], J. Dixon & B. Hocking[‡3],
N. Jarman & B Sturgeon[§4] and D. Bryan[^5]

[1]Lancaster Environment Centre, Lancaster University
[2]Department of Geography, University of Manchester
[3]Department of Psychology, Open University
[4]Institute for Conflict Research, Belfast
[5]Institute of Irish Studies, Queen's University Belfast

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Summary

The residents of North Belfast live in a highly segregated environment – one in which 'nationalist' and 'loyalist' communities exist in close proximity yet use very different spaces for their everyday activities. This paper describes how GPS tracking of residents in North Belfast is being used to build up a detailed spatio-temporal picture of how these spaces are being used. This will ultimately help the city council decide which spaces need to be opened up to reduce segregation and promote more equitable access to public environments and resources.

KEYWORDS: Space-Time, Mobility, Communities, Segregation, GPS

1. Introduction

The human geography of Belfast has inspired a long tradition of social science research, stretching from the classic work of Boal and others on sectarian divisions during 'the Troubles' (e.g. Boal, 1969, 1971, 1996; Doherty & Poole, 1997; Shirlow, 2003) to more recent work mapping the changing face of the post-conflict city (e.g. Murtagh, 2012; Lysaght & Baston, 2003). Much of this work has focused on the nature and consequences of residential polarization. Our study extends this literature by exploring emerging patterns of activity space segregation and integration in north Belfast. Segregation in North Belfast assumes a distinctive 'checkerboard' pattern in which 'loyalist' and 'nationalist' neighbourhoods exist in close proximity yet remain divided by various territorial boundaries, including peace walls, interface barriers and institutional structures (Figure 1). Perhaps because the two communities live in such close proximity, we believe that the management of the daily activities and routines of movement is especially important to local residents. Indeed, who goes where, when, why and along what routes is an ingrained feature of the local 'geographic imagination', making North Belfast a particularly rich context in which to explore activity space segregation.

The majority of research on segregation has investigated macro-level population distributions across residential areas of cities and, to a lesser extent, across institutions of employment and education.

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[*] d.whyatt@lancaster.ac.uk; gemma.davies@lancaster.ac.uk
[†] jonathan.huck@manchester.ac.uk
[‡] john.dixon@open.ac.uk; bryanna.hocking@open.ac.uk
[§] n.jarman@conflictresearch.org.uk; b.sturgeon@conflictresearch.org.uk
[^] d.bryan@qub.ac.uk

This research has been invaluable in mapping several fundamental characteristics of segregation and in revealing their often negative effects on outcomes such as poverty, health, social integration, and access to resources. However, it has failed to provide a complete picture of the nature, causes and consequences of segregation in urban environments. In their day-to-day lives, people spend a lot of their time outside the home, the workplace or institutions of learning. They use public spaces such as street corners, parks, markets, sports fields, and leisure spaces, and they travel along public pathways such as roads, footpaths, thoroughfares, and streets. Our study aims to determine how such routine behaviours create opportunities for interaction or help sustain isolation across intergroup barriers and understand the social and psychological processes by which they are shaped.

Figure 1: Examples of territorial boundaries and interface barriers in North Belfast: A: Loyalist Community, B: Nationalist Community and C: Barrier between Communities

Difficulties in acquiring relevant data probably explain why so little research has investigated the dynamics of activity space segregation. However, recent methodological advances in research on human mobility practices have opened up exciting new possibilities for studying these dynamics directly (e.g. see Palmer et al., 2013). Our study capitalises on such advances, specifically through the use of GPS technology to track individuals' everyday movements through urban spaces over time and GIS methods to integrate, visualise and analyse the resulting data. These data will then be used to estimate both individual and aggregate forms of activity space segregation.

2. Methodology

This study intends to recruit up to 250 participants from four neighbourhoods across North Belfast where nationalists and loyalists live in close proximity to each other. Each participant will use the application on their own phone to track their everyday movements for a period of up to four weeks. This will generate an unprecedented volume of highly detailed space-time data for each individual and facilitate novel forms of spatio-temporal analysis through integration with other data sources.

Positional data are captured on GPS-enabled smartphones using a custom Android application. Location data, comprising a longitude-latitude coordinate pair and 'accuracy' value from the on-board GPS receiver and a timestamp from the on-board real-time clock, are collected at 4-second intervals and stored in a local SQLite database. As with the design of any GPS tracking application on a mobile device, battery usage is of paramount concern. This is why a 4-second frequency was chosen for data collection in this research, as testing across multiple devices of various ages showed this to provide a good balance between high-resolution spatio-temporal tracking, and reasonable battery life for the mobile devices, which are still required by users for their 'normal' functions including telephone calls, text messages, email access and so on. When the mobile device connects to a Wi-Fi network, the data held in the local database are uploaded to a remote PostGIS database via HTTP requests and PHP scripts. This approach is designed to provide an optimal balance of battery efficiency (by limiting the number of HTTP connections), local storage (by removing uploaded data from the local database), cost (by using Wi-Fi data connections rather than mobile data), and the avoidance of data loss.

3. Results

Our study commenced in August 2015 and participant recruitment is currently ongoing. Figure 2 provides an illustration of the quality of the tracking data produced by the phone application. This was generated by a member of the research team during field trials and is unlikely to be representative of the everyday movements of residents in this part of the city. The coloured shading on the map provides a crude indication of nationalist and loyalist communities and shared spaces based on manipulation of 2011 census data to determine dominant religion (Catholic and Protestant for nationalists and loyalists respectively). In reality, the spaces that residents share or avoid are far more nuanced and one of the major challenges of this study will be to gain a greater understanding of these spaces (by day and by night) through a combination of walking interviews and participatory mapping activities.
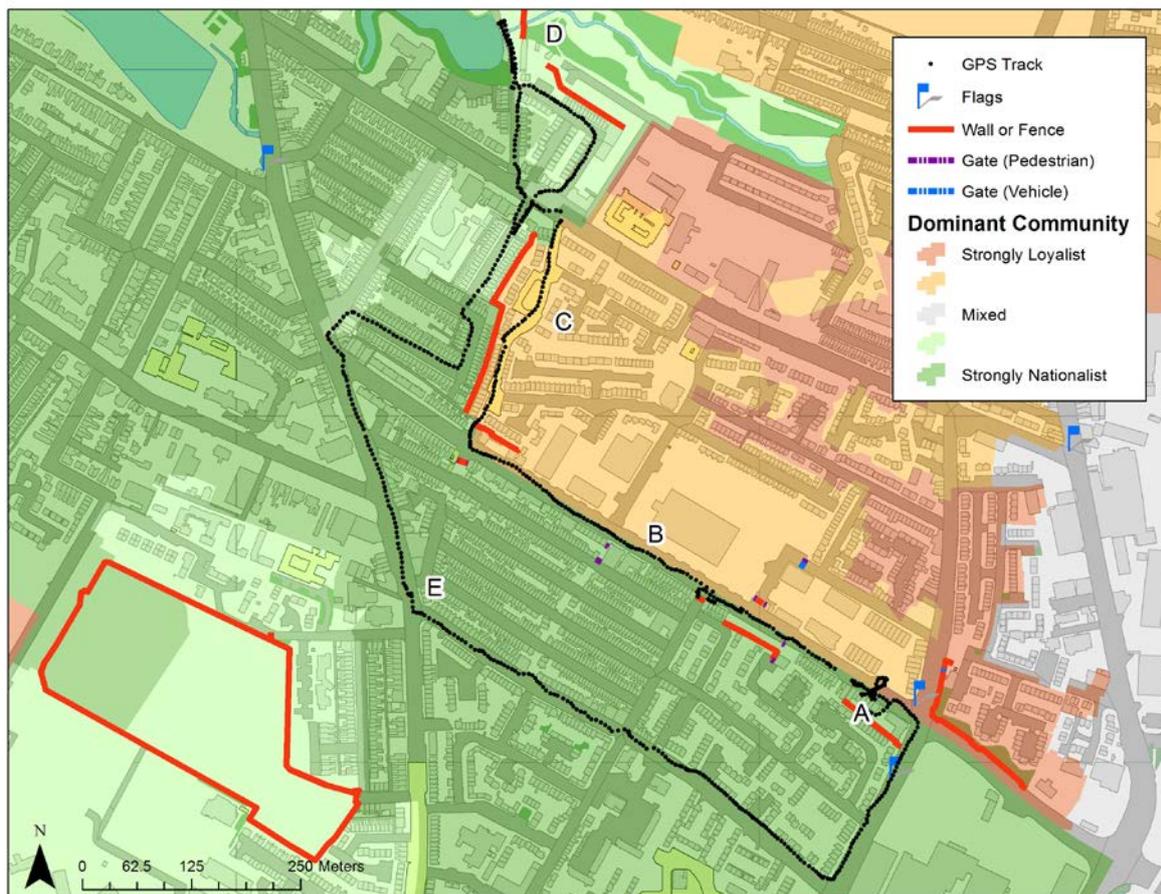

Figure 2: Sample pathway through North Belfast showing position of user relative to nationalist and loyalist communities, peace walls and barriers

The illustrative route, which was completed on foot, starts outside the Institute for Conflict Research in North Belfast (A) and proceeds along an interface area (B) with nationalist and loyalist communities occupying opposite sides of a major thoroughfare. It then passes through a barrier into a loyalist area (C) and then into a park. The route through the park is blocked by a 'peace wall' (D) then returns to the start point through a predominantly nationalist community (E). The route took 1 hour and 10 minutes to complete with the majority of the time (87%) spent in nationalist areas (886/1019 GPS points in Output Areas where the ratio of Catholics to Protestants exceeds 90%).

4. Conclusions

This paper has outlined the context and introduced the aims of a project that has the potential to provide an unprecedented level of insight into activity space segregation within the highly divided communities of North Belfast. Having described the techniques used to capture high-resolution space-time information the paper has gone on to show illustrative results of the detailed route data our study will be generating, along with a simplistic measure of activity space segregation. Routes and more sophisticated metrics generated by participants in the study will be shown in the conference presentation.

5. Acknowledgements

6. Biography

Duncan Whyatt is a Senior Lecturer in GIS at Lancaster University with research interests in both the natural and social sciences.

Jonny Huck is a Lecturer in GIS at the University of Manchester with research interests in the representation of vague geographical entities in geographical information science, novel approaches to cartography, and the application of new technologies to geographical problems.

Gemma Davies is the GIS Officer for the Lancaster Environment Centre, providing support for teaching and research throughout the department.

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