The spatial transcript: analysing mobilities through qualitative GIS

Phil Jones* and James Evans**

*School of Geography, Earth & Environmental Sciences, University of Birmingham, Birmingham B15 2TT

Email: p.i.jones@bham.ac.uk

**School of Environment and Development, University of Manchester, Manchester M60 1QD

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This paper identifies a failure by mobilities scholars to engage with the methodological and analytical possibilities offered by qualitative GIS. We argue this represents a missed opportunity and present the spatial transcript, a technique we have developed in order to address this shortcoming. Qualitative GIS seeks to find ways to analyse how space shapes data, offering a useful way in to investigating the mobile body. The spatial transcript allows researchers to engage in a process of grounded visualisation in order to analyse interview data in the context of the location in which it was gathered. We conclude that this technique offers valuable insights into the ways that space and mobilities are co-constructed.

Key words: qualitative GIS, GPS, mobilities, walking, cycling, UK

Introduction

Given the enthusiasm with which geographers have embraced the debate on mobilities in recent years, a renewed emphasis on the research potential offered by bodies in motion is unsurprising. In parallel to this, scholars have been developing notions of qualitative GIS as a means to explore the significance of the spatial in shaping the construction of non-quantitative data. There has, however, been limited attempt to bring these two debates together, through developing qualitative GIS approaches as a means to investigate questions of mobilities. In this paper we outline the idea of spatial transcripts, a technique we have developed attempting to bridge this divide.

The first section of the paper considers how GIS users have engaged with qualitative approaches and the lack of engagement by mobilities scholars with GIS. We argue that the latter is a curious omission, given the potential of qualitative GIS approaches for yielding new insights into questions around mobilities. Mobile methods developed by mobilities scholars can, as this paper demonstrates, be fruitfully combined with the spatial analytic power of GIS. While some of this potential has been explored, for example through artists' attempt to trace movements in space using GPS, applications in conventional social science are lacking.

The paper moves on to consider the spatial transcript, a technique we developed that synthesises qualitative data

with the spatial analytic power of a GIS in order to explore issues of mobility. Practical and conceptual issues are discussed through an examination of two projects engaging, respectively, with walking and cycling. We conclude that the spatial transcript represents a potentially powerful technique to explore how mobile subjects both conceptualise the spaces they move through and how these spaces in turn shape their reflections.

Qualitative GIS and mobilities

The qualitative GIS debate

It is comparatively easy within a GIS to produce, for example, choropleth maps visualising census data; indeed, this sort of exercise is a straightforward starting point when teaching GIS to novices. There is, however, a great deal more to GIS than simplistic visualisations of quantitative datasets. As Cope and Elwood (2009a) note, GIS is not merely a software system; rather it is an assemblage of social practices, technology, datasets and operations procedures. In the last 15 years there have been a series of debates emerging out of critical GIS, feminist GIS and participatory GIS that have transformed the ways that GIS is used every bit as much as the increasing technological capability of the software (McLafferty 2005; Pavlovskaya and Martin 2007; Kwan 2007).

One of the most exciting developments within GIS has been an increasing use of these systems within projects

based around qualitative data. This developing debate has been reflected in a theme issue of *Environment and Planning A* (Kwan and Knigge 2006) and a subsequent edited collection by Cope and Elwood (2009b). Qualitative GIS seeks to take a different kind of approach to data collection, analysis and visualisation. The aim is to look at *how* individuals understand space and what the impacts of these understandings are for the production of socio-spatial relations.

A common misapprehension about GI systems is that they are not well placed to undertake the work of generating these socio-spatial understandings. If we start by considering the kinds of data that can be used, even as early as the 1990s, hyperlinks, images, sounds and video have been commonly employed alongside the more conventional numerical and text-data (for a review of early work in this area see Cartwright 1997). The question is *how*, rather than *whether*, these data can be integrated and interrogated within a GIS (Dennis 2006). A geotagged photograph, for example, located by GPS coordinates can easily be tied to the familiar GIS landscape of points, lines and polygons within cartographic space. More challenging are outputs that are not cartographically accurate, for example mental mapping exercises. There are, however, ways to get around these kinds of problems with more or less satisfactory compromises. Brennan-Horley and Gibson (2009), for example, gave participants cartographically standard maps of Darwin, Australia, over which to draw their mental maps of creative spaces within the city. The base maps had enough detail for participants to locate themselves, but not so much that they might 'lead' participants to produce outputs in line with what they thought the researchers wanted to know.

When it comes to data analysis, GI systems are well placed to examine qualitative materials. Indeed, despite GIS being based on a series of complex mathematical algorithms, Pavlovskaya (2009) notes that, perhaps somewhat paradoxically, the tools for statistical analysis within these systems are relatively unsophisticated. Some of the most compelling spatial analysis tools within GIS, such as overlay, buffering, examining data in the context of its spatial neighbours and so on require no real quantitative skill on the part of the user. One can, for example, use these tools to filter a large dataset of geotagged photographs. Photos taken within a particular residential neighbourhood can thus easily be identified and examined to see how they differ thematically from those taken elsewhere within a city.

In many ways the most powerful feature of GIS in data analysis is in the capacity to visualise large datasets. This property can be problematically seductive – the choropleth map can be both visually appealing and apparently authoritative (Schuurman 2000). By flattening large spatial

extents into a single category, however, they occlude the complex and diverse lives led by individuals within those delineated regions. Nonetheless, the practice of sitting in front of a computer trying out different ways of visualising datasets can be a highly productive mode of analysis for the GIS user, distinct from the final maps that may be produced for publication. Indeed, the visualisation process can be as productive for ruling out avenues of enquiry as it is for identifying spatially significant phenomena. Knigge and Cope (2006) have described this practice as 'grounded visualisation', drawing on the tradition of grounded theory where analysis proceeds iteratively to allow theories to emerge from the data.

Spatialising qualitative data

A number of innovative projects have sought to bring GIS together with the kinds of conventional qualitative techniques perhaps more familiar to those working on mobilities. One example is in participatory photography exercises, where photos can be geotagged and added to a GIS database (Dennis *et al.* 2009). Similarly Hawthorne *et al.* (2008) have brought together Q-method photo sorting exercises and GIS to examine responses to the conversion of suburban rail lines into urban cycle/pedestrian trails. The key advantage of adding GIS to these analyses is that they allow the researcher to identify the role of space in shaping the data gathered.

The importance of considering the spatial in this way has begun to be recognised by those trying to find ways of integrating computer-assisted qualitative data analysis software (CAQDAS, e.g. NVivo) with GIS (for example, Fielding and Cisneros-Puebla 2009). Some CAQDAS now offer users the capacity to geotag parts of the data, much as one would code a section of text against a particular theme. Perhaps the most impressive example of this is seen in the 'geo-ethnography' undertaken by Matthews *et al.* (2005). Here a survey of 2400 households, combined with a detailed ethnography of a further 215 families has been used to explore issues of welfare and child development. All mentions of specific places within the dataset were geotagged within a CAQDAS. This allowed subsequent analysis that placed the lives of families as recorded in the qualitative data within the context of their neighbourhood and everyday spaces.

Matthews *et al.* (2005) noted some problems in persuading their (largely non-geographer) research team that the spatial was a significant factor to consider. Nonetheless, their attempt to examine the spaces through which people live alongside their experiences points to the great potential offered by combining conventional qualitative methods with GIS. As a general approach it can shed new light on old problems. McCray and Brais (2007) have interrogated issues of unequal access to transportation using a GIS based on not simply participants' spatial

proximity to public transport routes, but also their experiences of how travel is integrated into their lifestyles.

Kwan and Ding (2008) have taken this one stage further using a 3D visualisation module (ArcScene) to create space-time diagrams based on participants' activity diaries. In itself, this is not particularly groundbreaking, but in combination with oral histories taken shortly after the activity diaries were completed, rich qualitative data were produced showing the changes in the everyday activities of Muslim women in Columbus Ohio in the aftermath of 9/11 (the data were collected in 2002). Kwan and Ding developed a specific tool, 3D-VQGIS to undertake this analysis, giving some of the functionality of CAQDAS within ArcGIS. In a similar vein Jung and Elwood (2010) have created a hybrid CAQ-GIS that allows a range of different data (photos, drawings, comments and so on) to be coded and analysed within the GIS. This means that data can be simultaneously queried both spatially and against qualitative codes facilitating a practice of grounded visualisation.

Mobilities and GIS

Both Kwan and Ding (2008) and Jung and Elwood (2010) have made sophisticated attempts to combine the analytic power of GIS and CAQDAS, though in both cases relying on custom scripts within GIS in order to do so. More generally, however, the systems are not particularly well integrated and the spatial analysis tools within CAQDAS are rather basic. This is unfortunate as the new interest in issues around mobility lends itself to an approach that combines interview, participant observation, field diary and other materials with data relating to location. One problem, however, is in the range of scales across which mobilities scholars operate. While the flickering of eyelids among a conference audience (Merriman *et al.* 2008) and transnational flows of migrants (Thieme 2008) are both doubtless manifestations of the body-in-motion, the differing scales perhaps require different ways of thinking about these issues and definitely require different research methods to explore them.

The issue of method has been directly addressed by Büscher and Urry (2009), who outline the variety of different approaches that can and have been employed in the study of mobilities. They do, however, emphasise that the different scales of bodily movement within mobilities can and do overlap (see also Mai and King 2009). Büscher and Urry (2009) make almost no reference to the possibilities offered by GIS, however, beyond a brief mention of collecting GPS coordinates in relation to the emergency services and the future possibilities offered by 'social positioning' through mobile communications technologies.

This omission signals the fact that much of the work examining mobile bodies has relied upon fairly conven-

tional qualitative methods. These range from critical reflection on the researcher's own behaviour (Wylie 2005; McCormack 2003) through participant observation and ethnography (Cuthill 2007; Holley *et al.* 2008; Bissell 2010), to survey and interview techniques conducted in a variety of locations (Watts and Urry 2008). There is also a growing body of work where researchers travel with participants undertaking the activities being studied. Laurier and Philo (2003), for example, accompanied sales representatives driving around visiting clients, whilst videoing their activities. Pink (2007) has also deployed video, filming research participants whilst walking to explore the role of the sensory in place making.

Walking with participants has attracted a good deal of attention as a means of accessing responses to specific locations and environments as these are passed through. Kusenbach (2003) refers to the practice of accompanying participants on their daily walks as 'go-alongs', although there are a number of different approaches to walking with participants utilising greater or lesser degrees of freedom in the routes chosen (Carpiano 2009; Ricketts Hein *et al.* 2008; Hall *et al.* 2008). The action of walking with participants can give a variety of insights into their lives, such as Middleton's (2009) examination of walkers' understandings of time and Anderson's (2004) walks with environmental protestors. Work in a similar mode, where the researcher accompanies the participant while in motion, has also been undertaken examining the embodied practices of cycling (Spinney 2009; Brown *et al.* 2008).

Go-along and other mobile methods have advantages when attempting to access the lived experience of particular kinds of mobility, primarily because of the immediacy they bring. There have, however, only been limited attempts to combine mobile methods with geospatial technology. While GPS (which is integral to the qualitative GIS method we describe below) cannot say much about small-scale bodily movements such as the flickering of eyelids, it can be used in a variety of innovative ways to think about the body-in-motion that move beyond the purely transport-focused. Parks (2001) used GPS to record a snapshot diary of her movements and reflected on how these traces represented a very different kind of mobility to, say, a migrant worker, lacking the same privileges of wealth. The record of the movement in itself not only provided a means to explore issues of class through mobility, but also served as a means to make conventional mapping more subject-orientated, juxtaposing the disordered movement of the body represented in points and lines against the nominal objectivity of Cartesian cartography within a GIS. In a more overtly artistic mode, the Amsterdam Realtime project tracked the movements of a group of Amsterdam residents, automatically relaying their GPS location via mobile phone to a large video

display in Dam Square to raise interesting issues about how a city is constituted through movements (Proppen 2006). Christian Nold's biomapping project has taken this one stage further, adding galvanic skin response measurements to GPS, mapping arousal/stress by participants and tagging these traces with quotes from participants interviewed after their walks explaining what was happening to stimulate them in a given location (Nold 2009).

In the remainder of this paper we outline a technique we have developed to bring together the rich narrative data of the mobile interview with the capacity of qualitative GIS to analyse the role of space in shaping those data. We argue that the spatial transcript represents a potentially powerful technique with which to explore how mobile subjects not only move through, but perceive, understand and construct spaces.

Spatial transcripts

Creation

The method we outline here was developed over the course of two research projects. The first comprised 19 walking interviews undertaken in the Digbeth/Eastside area of Birmingham, UK. The second asked 28 commuter cyclists, all employees of the University of Birmingham, to record an unaccompanied audio diary during their ride home. The essence of the technique we developed is in matching the words participants speak while moving to their GPS location in order to produce a spatial transcript. A key advantage of this automated technique against, say, taking field notes of the location where a participant made a particular comment, is that it allows the location of apparently ephemeral comments to be recorded, without the researcher having to constantly note location/time during the interview. This produces a much richer range of data that can be geolocated and thus analysed spatially, without omitting that which may have seemed trivial at the time. Furthermore, some mobile activities, such as cycling, are not conducive to in-situ note-taking. In addition it allows participants to make more faithful geolocated audio diaries in the absence of a researcher, without asking them to periodically break off from their reflections in order to say where they are.

Participants are asked to wear a microphone, audio recorder and GPS device. The resulting audio recording is fully transcribed, divided into a table with each cell containing 10 seconds worth of text. These cells are then matched up to a GPS log also recorded in 10-second intervals. We chose this time interval following field tests where we found that this gave a reasonable level of positional accuracy to where the words were spoken as people moved, whilst at the same time producing a manageable quantity of text to tag against each GPS point in the recording. Inevitably this is a compromise that has to

be borne in mind when undertaking spatial analysis of these data, even before taking into account the accuracy of GPS, which for the inexpensive equipment we have used is around 6 metres (or less in heavily built-up areas).

Analysis

The outcome of the process described above is that the interview is represented as a series of points within a GIS, each one of which contains a piece of the transcript. These spatial transcripts can thus be generated without recourse to custom scripts within the GIS, giving the technique the advantage of simplicity. Within the GIS, the data can be analysed using familiar spatial analysis tools combined with SQL-queries. At a basic level this might be looking for occurrences of a particular word or set of words within the transcript and examining the position of these relative to other locations within the map. Through grounded visualisation the data can be systematically interrogated to examine the influence of space upon the interviews conducted.

In the Digbeth project, for example, local stakeholders were asked to give the researcher a 'guided tour' around the area, exploring why it held personal or professional interest to them. Using SQL queries one can identify the location where particular features in the urban landscape were mentioned by participants during their walks. Figure 1 would appear to indicate that there is no consistent pattern to the average distance between location of comment and location of feature, but by visualising the data within the GIS it becomes apparent that the Bullring, Millennium Point and the Curzon Street railway offices are all visible from various locations around Digbeth, because of both the size of these buildings and their relation to the local topography. Major features such as Latif's wholesalers and the railway viaducts, with their much shorter average distance-to-mention, are more deeply buried within the urban tissue and so are only encountered visually, and subsequently in the transcript, when participants were all but on top of them.

This is significant for mobilities researchers because, in using qualitative GIS to show how space shapes the data, it starts to tell us something about how people relate to their local area as they move around it. In and of itself, this is not a particularly exciting finding, having clear echoes of Lynch's (1960) work on legibility and how people navigate around urban space. What it does suggest, however, is that even at this basic level of analysis the spatial transcript allows the identification of general trends in how participants move around and talk about particular spaces.

Rather than relying solely on simple word searches within the GIS dataset, however, we have utilised a two-stage process for interrogating the transcript data. The transcripts were first analysed within a conventional

Figure 1 Transcript analysis extracted from the GIS measuring the average distance between a feature and the location where it was talked about by participants on the Eastside project

CAQDAS (we used NVivo) to undertake an iterative coding exercise, identifying key themes that emerge from the data. Using Microsoft Excel each 10-second piece of text within the transcripts was coded according to the themes that came out of the NVivo analysis simply by adding extra columns alongside each cell of transcript data. These extra columns of data were then imported into the spatial transcript dataset within the GIS where they could be queried using SQL.

While NVivo can be directly integrated with Google Earth, the spatial analysis tools available are fairly limited. In being able to tag coded themes to location within a ‘full’ GIS, however, our method allows for a more powerful examination of how people talk as they pass through space. In the cycling project participants rode home alone having been asked to vocalise whatever was going through their mind during the journey. A simple text search of a transcript for ‘work’ would not necessarily pick up on all instances of a participant discussing issues relating to the workplace. Thematic coding allows these instances to be identified. Intuitively one might expect participants to discuss matters related to work to a greater extent when in proximity to the workplace; a buffer analysis revealed that just under half of such comments made (12 of 25) occurred within a kilometre of the institution (the average journey home among the participants was 6.6 kilometres). At the same time only 5 out of 33 instances of discussing home life occurred within that same 1-kilometre buffer, indicating that participants were

more likely to talk about domestic matters the further they travelled from work. This reiterates the point that passing across different spaces can have a dramatic impact on the issues people discuss, even within what is, on a bike, a relatively short distance. Without undertaking a thematic coding exercise, these patterns would have been much more difficult to identify.

These general patterns only say so much, of course, and the data need to be drilled down into to explore specific issues. The advantage of these spatial transcripts is in allowing broad spatial patterns to be identified that suggest topics for more in-depth investigation. Participants in the cycling project riding on the city’s segregated waterside cycle routes spoke more as measured by the average character count per 10 seconds of transcript: 66 characters on the waterside routes, compared with an average of 53 characters elsewhere. The reasons behind this loquaciousness are an interesting topic of investigation that may shed light into how people are able to conceptualise different spaces of mobility. While only 33 per cent of total journey distance took place on these routes, 66 per cent (25 of 38) of discussions of animals and 66 per cent (32 of 48) of discussions relating to the natural world did so. Some of these waterside spaces are quite beautiful, prompting enthusiastic commentary on the nature and the environment, as one participant reflected:

That’s certainly one thing you notice along here, the heron population. There must be three, certainly, four

perhaps that have regular patches along this bit of canal. Used to think they were the same one, but it's clear they're not now. That is a nice thing you do actually, I suppose, cycling, be aware of the seasons, changing nature around you. (Participant 20, 2 September 2009)

A general category of participants talking positively or negatively was created for each 10-second piece of the transcripts. Some 39 per cent (181 of 454) of positive preferences expressed by the cyclists took place on water-side routes, which is only slightly above what one would expect given the amount of participant journey distance that took place there. Certainly it is not as dramatic a skew as one might expect given the popular perception of urban road cycling as being a generally negative experience. Indeed, though the majority of discussions about traffic took place on the roads (60 of 65), 30 of the discussions about traffic were either neutral or positive, for example:

I often feel a sense of smugness if there's a traffic jam. When I'm on a bicycle I feel like shouting 'yar boo sucks, ha ha'. Not sure I wouldn't be laughing if I was in that jam. (Participant 15, 11 August 2009)

Without the spatial context this quote is merely a general comment on traffic conditions. Knowing, however, that the participant has been prompted to reflect in this way while on a bridge crossing the M5 motorway as part of a cross-country ride gives a more nuanced understanding of why the participant chose to raise the issue, particularly in the context of his own commuting patterns.

The value of the spatial transcripts is in giving the capacity to more explicitly examine the impact of movement through different spaces on the kinds of data generated. This need not always look directly at the words being spoken. We were, for example, concerned on the Digbeth project that background noise of traffic would drive our participants to choose quieter routes to conduct their guided tours and thus miss out on lingering in noisy, but possibly interesting spaces. A crude background noise survey undertaken across the study area and interpolated into a noise 'surface' using an inverse distance-weighted algorithm in ArcGIS was examined against the GPS record of all routes participants had guided our researcher. This showed no evidence that noisier areas were being deliberately avoided, providing reassurance that the stories being gathered were not being unduly skewed by, for example, the busy bus route along Digbeth High Street. Again, however, without the capacity to visualise the interview data within the spatial context of the noise survey, we would be unable to assess the significance of environmental characteristics

of different spaces in shaping the qualitative data gathered.

Conclusions

Qualitative GIS has emerged over the last decade as one of the most significant analytical and methodological developments within contemporary geography. During the same period the mobilities debate has become a key theoretical trope. This paper has identified, on the one hand, the advantages of utilising a qualitative GIS approach when seeking to examine the role of space in shaping data and, on the other, mobilities scholars' lack of engagement with GIS. We have argued that the spatial transcript is a means of bringing the analytical power of qualitative GIS to bear on issues of mobilities.

One advantage of the spatial transcript is its methodological simplicity. The data collection process does not rely on expensive field equipment – following field tests on the walking project, we settled on the use of a cheap digital Dictaphone combined with a wearable sports-watch style GPS recorder that cost less than £150. Once protocols for recording and transcribing data are established, spatial transcripts can be produced in little more time than those for a conventional interview. Transferring the thematic coding from the CAQDAS into the spatial transcript is a straightforward matter that, although not automated, has the advantage of not requiring custom scripts to be written within GIS. Where mapping plug-ins to CAQDAS are limited to simply displaying data, the spatial transcript can be subjected to the full range of spatial analysis tools available within a GIS. This means that the data can be rigorously analysed through a process of grounded visualisation.

More importantly, however, the spatial transcript extends the range of possibilities for analysing mobilities temporally and spatially. This complements existing qualitative GIS approaches such as Kwan and Ding's (2008) visualised activity diaries, but represents a significant methodological advance. In common with other qualitative GIS work, spatial transcripts do not simply spatialise qualitative data, but show how space shapes data. Perhaps in part because the role of space shaping data is now uncritically accepted in qualitative research, the mobilities debate seems to have paid scant attention to the effects that moving between spaces might have on the data generated. The spatial transcript technique brings these effects to the fore, meaning that mobility itself can be considered as a variable within the analysis of qualitative datasets.

This technique therefore offers mobilities scholars insights into the experience of the city in motion and, indeed, the different kinds of cities and subjects produced through different kinds of mobility. In turn, spatialised understandings of the 'walking city' or the 'cycling city'

could, for example, provide important alternative representations for planners and urbanists seeking to engage with low carbon transport planning, or envision the 'sustainable city' more generally. As such, bringing together mobilities and qualitative GIS is not simply an intellectual exercise, but offers decisionmakers rigorously analysed understandings of how spaces are produced through movement and the implications of this for everyday life.

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