Using GPS and GIS to Enrich the Walk-along Method

Natalia Martini

Abstract
This article demonstrates what may be gained from combining the walk-along method with the global positioning system (GPS) and geographical information system (GIS) when exploring the social and physical aspects of locally situated daily lives. It focuses on the premise and application of the spatial transcript technique, which allows for an integration of qualitative and GPS data generated while walking, and its subsequent visualization and analysis within GIS. It suggests that incorporating geospatial technologies into the walk-along method might serve as means to operationalize particular spatial sensitivity afforded by this mode of inquiry and effectively advance its utility for yielding spatially sensitive insights.

The walk-along method, also known as a “go-along,” a “walking interview,” or simply a “walk,” is “a hybrid between participant observation and interviewing” (Kusenbach 2003:463). Conducting a walk-along typically involves engaging in conversations with and observations of informants and their interactions with socio-material surroundings during natural or contrived outings in local environments. There is a variety of ways in

1 Institute of Sociology, Jagiellonian University, Kraków, Poland

Corresponding Author:
Natalia Martini, Institute of Sociology, Jagiellonian University, 52 Grodzka Street, 31-044 Kraków, Poland.
Email: natalia.martini@doctoral.uj.edu.pl
which a walk-along may be arranged, with main differences lying in the
degree of informants’ familiarity with the environment, route determina-
tion, interview standardization, and structurization as well as the degree of
the researcher’s participation in observation activities. Irrespective of the
terminology used or the particular approach adopted, the essence of con-
ducting a pedestrian inquiry may be considered as constituted by “walking
with […] research participants as they experience, tell, and show their
material, immaterial and social environments in personally, socially and
culturally specific ways” (Pink 2007:240).

The flexibility and adaptability of the walk-along method, which can be
tailored to the needs of varied research projects (Carpiano 2009), is
reflected in multiplicity of its uses within a range of disciplines and research
areas (Pink et al. 2010). The walk-along has been found particularly suited
for exploring phenomena such as environmental perception, spatial prac-
tices, biographies, social architecture, and social realms (Kusenbach 2003).
More recently, it has been identified as useful for learning about the mean-
ing of neighborhood for people living with dementia (Odzakovic et al.
2018), assessing young people’s experiences of living in deprived urban
neighborhoods undergoing regeneration (Clark 2017), or investigating the
spatial aspects of noncitizenship (Holgersson 2017).

What seems to unite the varied applications of the walk-along method is
“the assumed value of experiential engagement between the researcher,
participant and their spatial context to generate situated knowledge”
(Thompson and Reynolds 2018:2). The literature on the methodological
practice of walking suggests that it is the bringing of the surrounding envi-
rонment into the research process that constitutes a major advantage of the
walk-along method. “Being out there” with informants affords particular
spatial sensitivity, which, in turn, offers privileged insight into the socio-
material milieu in which informants’ daily lives are situated.

Despite the often-stated importance of bringing the locality into the
research process, there has been relatively little attention focused on the
practicalities of making the spatial context explicit (with a few notable
exceptions, see, e.g., Pink [2007] on providing spatial context with the use
of video, Carpiano [2009] on including location information through oral
and written note-taking, and Evans and Jones [2011] on the use of location-
aware technology). In other words, there have been limited attempts to
address the question of how to operationalize spatial sensitivity afforded
by the walk-along, particularly regarding the later steps of implementation
of this method, namely making sense of data produced while walking. This
article is meant to fill in this gap by demonstrating how explicit spatial
contextualization of the situated knowledge generated during walking may be achieved by using geospatial technologies (i.e., the global positioning system [GPS] and the geographical information system [GIS]). The aim of this article is to consider the mechanics of producing and handling spatially explicit walk-along data and thus contribute to advancing the utility of the walk-along method for yielding spatially sensitive insights.

Drawing on experience deploying the walk-along combined with GPS and GIS as a method for exploring the city as it manifests itself in the practical course of everyday life of its homeless dwellers, I discuss the premises and practicalities of mapping the walk-along data. I present how the spatial context for the outcomes of the research walks may be provided through the use of a georeferencing technique called “spatial transcript” (Jones and Evans 2012). In the following, I give specific steps on how to create a spatial transcript, followed by reflections on its analytical potential for socio-spatial research. I end with a vision of a way forward for advancing the walk-along method for generating and making sense of geospatial data along with qualitative data.

Walking with(out) Mapping

In 2008, and then again three years later, James Evans and Phil Jones, the authors of the spatial transcript technique, observed with unconcealed surprise that “a number of projects making use of walking interviews have made little or no attempt to map the data” (Evans and Jones 2011:851; Jones et al. 2008:4). They criticized walking scholars for this lack of engagement with the possibilities offered by GPS and GIS, calling it a “missed opportunity,” or even a “failure” (Jones and Evans 2012). Even though the recognized lack of attempt to map the data becomes less surprising when we consider the fact that geographers Evans and Jones directed their criticism at the work of sociologists, anthropologists, and ethnographers—the representatives of disciplines that have been familiar with the notion of mapping for far less time—their observation has not lost its timeliness. The majority of walking scholars still manage to do valuable research without the use of geospatial technologies (for recent examples, see Bates and Rhys-Taylor 2017), relying on the premise that walking with participants affords spatial sensitivity by serving as a means of education of the researcher’s environmental perception (Kusenbach 2003; Pink 2007), as well as allowing for the surrounding environment to prompt place-specific discussions (De Leon and Cohen 2005; Hall et al. 2006). The walking scholars’ lack of engagement with GPS and GIS may, on the one hand, be making a case for
Merriman’s (2014) objections to the overreliance on technological solutions to methodological questions; on the other hand, though, it may indicate that the attachment to disciplinary methodological traditions is still strong and the proliferation of the uses of transdisciplinary approaches (such as these coming from the combination of the walk-along with geospatial technologies) is yet to come. These concerns aside, I wish to discuss in more depth the technological and methodological solution that enables geospatial data to contribute to the research done “out there” and “on the move” and may prove useful (not obligatory) for walking scholars who are interested in exploring the social and physical aspects of locally situated daily lives.

In what follows, I discuss the role that GPS (as a tool for spatial data collection) and GIS (as a tool for storing, managing, visualizing, and analyzing spatial and nonspatial information) can play in advancing the methodological practice of walking by opening up different understanding of spatialization of the walk-along data. My considerations are based on an ongoing, multi-method sociological study informed by theories of practice (Schatzki et al. 2001), empirically focused on the homeless city (i.e., the city as it is encountered in the practical conduct of life by homeless dwellers). Within this study, I have adopted Kusenbach’s (2003) “naturalistic” approach toward engaging with informants “out there” and “on the move,” rooting the walk-alongs in informants’ everyday routines with respect to the routes taken, locations visited, and activities performed along the way. I have used the “natural” walk-along method to explore how homeless urbanites navigate the city (i.e., how they routinely move through and interact with the urban environment). To be able to map the routes they take, the pauses they make, and the practices they perform in different locations, I have accompanied my informants equipped with an audio recorder and a GPS device. I have combined audio recording of the course of the walk-alongs with GPS tracking of their spatial trajectories by using spatial transcript technique.

**The Creation of Spatial Transcripts**

The spatial transcript is essentially a technique of creating georeferenced transcripts, allowing narrative and spatial data generated while walking to be integrated, visualized, and analyzed within GIS. This procedure, developed by Evans and Jones, provides a means to map the conversations that took place while walking by linking fragments of transcripts to specific locations obtained from GPS records and plotting them on a map in a GIS software. It opens up the opportunity to analytically approach the research
material generated while walking both qualitatively, through applying qualitative coding procedures, and spatially, through performing spatial operations.

The original protocol for creation of spatial transcripts (Evans and Jones 2011; Jones et al. 2008; Jones and Evans 2012) was based on the assumption that an accurate location information, required for grounding the narratives, can be acquired in urban environment with the use of inexpensive, commercially available GPS device, and that unprocessed GPS records can be then synchronized with transcribed audio recordings by simply matching their time stamps. It did not take into account the necessity of assessing the quality of GPS tracks and addressing the problems caused by the occurrence of systematic and random errors of GPS measurements. As the literature on the GPS-based research suggests, GPS tracks usually require cleaning and smoothing before further processing because a number of environmental conditions and technological factors can disturb GPS signal transmission, especially in built-up urban areas, resulting in a lack or a significant inaccuracy of the recording (Schuessler and Axhausen 2009; Stopher et al. 2005; Wang et al. 2017). What is more, the trajectories of the “natural” walk-alongs are likely to include bundles of GPS points recorded while not in motion that typically extend “over a diameter of about 30 meters if the person stays at the same place, approximating three times the standard deviation of the measurement inaccuracies” (Schuessler and Axhausen 2009:9). Clustered GPS points, although usually encumbered with errors, are indicative of so-called activity locations (Schuessler and Axhausen 2009), locations at which the researcher and the informant have stopped to engage in an activity or talk for an extended period of time. Engaging in an activity during a walk-along may also result in missing GPS points, when the activity is performed indoors and the GPS signal is completely lost.

Drawing on the insights from the literature on the GPS-based research, as well as my own field experimentation, I have established a protocol for creation, visualization, and analysis of spatial transcripts which in many aspects resembles the one developed by Evans and Jones, while adding solutions to the abovementioned challenges. I have developed this protocol as part of the preliminary stage of my research project during which I carried out 10 “natural” walk-alongs with six homeless inhabitants of the city of Kraków, Poland, with whom I had established relations while volunteering in an informal soup kitchen Zupa na Plantach. The walk-alongs lasted from 50 minutes to over 10 hours and took a form of participation in a natural unfolding of daily routines (when I accompanied the informant as she went about her day) or participation in a reenactment of typical
everyday trips (when the informant reenacted her typical day to demonstrate its routine course) or a guided tour (when the informant retraced spatial patterns of her everyday mobilities and moorings and guided me through them without engaging in any activities). I used GPS Logger for Android combined with Active GPS application installed on a Samsung Galaxy J3 2017 smartphone to record the routes, with the frequency of the GPS signal record set for 30 seconds, and an average precision of the position estimates, before processing, of around 8 m. I used Zoom H1 voice recorder with a lavalier microphone to record the conversations. I visualized and analyzed the outcomes of the research walks in ArcGIS, a GIS software developed by Environmental Systems Research Institute, Inc.

The established procedure involves the following steps:

(1) Data Collection
   (a) The first step in the walk-along data collection is to turn on the GPS device and wait for it to acquire the first position fix, which, depending on the circumstances, may take as much as 15 minutes (Stopher et al. 2005). Then, the audio recorder can be turned on. The audio recording should start with the researcher dictating a synchronization cue, saying the exact start time of the recording. Now, the walking and talking can begin. At the immediate conclusion of a walk-along, it is advisable to describe its course and list all the stops made along the way. This will provide a reference sources for the subsequent quality assessment of the GPS record.

(2) Data Processing
   (a) Data processing begins with cleaning the GPS record in a GIS software. GPS points recorded before the synchronization cue need to be deleted first, then erroneous GPS points need to be filtered out and removed. Depending on the information available and the rules adopted, different criteria may be used to clean GPS data (Wang et al. 2017), including the following two: NSAT $\geq 4$ (number of in-view satellites, where 4 is the minimum number of satellites to measure the position accurately) and PDOP $\leq 5$ (position dilution of precision, measuring the effect of the geometry of satellites on positional measurement precision, with 5 being the value that indicates the level of accuracy generally considered as “good”).
   (b) Once the GPS record has been cleaned, its spatial trajectory can be simplified by smoothing the clusters of GPS points recorded
while not in motion (Online Supplement 1). The clusters first need to be identified through a visual check of the GPS track displayed on a base map, aided by the verification with the previously prepared list of the stops. Once the list of the “activity locations” has been verified, the GPS “breakpoints” marking the beginnings and ends of the stops need to be identified. This may be achieved through examination of the clustered GPS points’ IDs and time stamps, both indicating the sequence of the recorded GPS points crucial for determining which points belong to an “activity location” and which to a trace of movement. Especially when the spatial trajectory of a walk-along is not unidirectional and chronologically succeeding, GPS points are positionally mixed together in a cluster. An aid for the identification of “breakpoints” can also be the information about the recorded movement, represented by the speed value and distance between consecutive GPS points (Stopher et al. 2005). Once the beginnings and ends of the stops have been identified, the GPS points recorded between them can be exported to a separate data layer, saved for further analysis, and removed from the processed record.

(c) The last step in GPS data processing consists of its manual adjustment to the settlement structure and road network, when the recorded trajectory of the walk-along significantly deviates from the routes actually taken (Online Supplement 2). This can be achieved by examining the GPS record against the description of the course of the walk-along and a base map and manually adjusting erroneous GPS points’ metric georeferences. Once these inaccuracies in the GPS record have been corrected, geospatial data are ready for integration with narrative data.

(3) Data Integration

(a) The first step in data integration takes place in Microsoft Excel, into which the IDs and time stamps of the processed GPS points need to be exported. The elapsed time between GPS points needs to be calculated, then the audio recording needs to be transcribed and divided in pieces, with the length of the fragments corresponding with the calculated time intervals.

(b) Once the audio recording has been fully transcribed in such manner, it can be combined with a GPS record within the GIS software. Joining the two data sets has the effect of matching GPS points “1,” “2,” “3,” and so forth, recorded x-seconds apart,
with x-second fragments of the conversation that took place between spatial locations “1” and “2,” “2” and “3,” and so forth (Online Supplement 3).

In the following section, I will reflect on the analytical steps that may be taken once the transcribed audio recording has been combined with the location information.

**Contribution of Geospatial Technologies**

As previously noted, one of the key purposes of creating spatial transcripts is to integrate qualitative material generated while walking with location information. This step opens up the possibility for taking advantage of the geovisualization and spatial analysis capabilities of GIS as well as analytical techniques more familiar to qualitative walking scholars especially those acquainted with computer-assisted qualitative data analysis software packages, such as NVivo 12.

At a basic level, the analysis might entail a straightforward representation of qualitative material within cartographic space and the examination of interview transcripts and location information in concert with one another. By following the narratives as they unfold in space, the researcher can explore how research participants relate to their local environment as they move around it (Jones and Evans 2012). More focused examination of the relationship between speech and location may be carried out through word searches within the spatial transcripts (Evans and Jones 2011). Text search query performed in a GIS software will result in retrieving all locations (GPS points) where a particular word or phrase was mentioned, enabling the researcher to examine, for example, the specificity of locations associated with the term “fishing” used by homeless inhabitants of Kraków to describe a particular type of begging practice.

More interpretative mode of analysis is possible once the spatial transcripts have been coded (Jones and Evans 2012; i.e., the meaning of the narrative excerpts associated with particular locations has been condensed into a descriptive or analytical label; Online Supplement 4). There is almost no limitation as to the coding strategy adopted. The only condition that a coding strategy must meet is that of being suitable for implementation to predefined coding units, which, in case of the spatial transcripts, are determined by the amount of text assigned to a particular location. Codes are assigned to GPS points as attributes and stored in an attribute table. As such they might be, for example, color coded and displayed on a map for visual analysis of emerging patterns of themes discussed during walking. They
might also be queried both nonspatially and spatially, meaning that they can be selected based on their value and/or spatial relationship with other spatial features. For instance, the researcher might be interested in finding all locations associated with a code “practice of care” (a query on attribute values) that, at the same time, do not intersect with or are not identical to locations (a query on spatial relationships) of the homeless services (although this requires mapping the homeless services first) to identify and examine the material anchors of the acts of care that homeless urbanites might experience outside of the institutional context.

I have used the abovementioned techniques to reconstruct the image of the city of Kraków as it manifests itself in the practical course of everyday life of its homeless dwellers. I used spatial transcripts coded against everyday practices described or enacted by homeless urbanites with whom I had walked to identify their meaningful locations (i.e., material anchors for activities that make up their daily lives). I classified them according to their practical meaning and atmosphere (Reckwitz 2012). This enabled me to capture and represent Kraków in its functional and affective intelligibility for homeless dwellers (Online Supplement 5). Before concluding, I will briefly comment on what GPS data alone can add to the research done “out there” and “on the move.”

When carrying out natural walk-alongs, with the routes determined by the research participants, knowledge about where the walks have taken place may turn out to be as important as the information about where they have not (Clark 2017). The researcher may be interested in exploring microgeographies of everyday life with their unobvious topographies, or ecological positions with their effects on the spatial inclusion and exclusion, as I myself have been during the Homeless City project. In such a case, the GPS records of the routes taken may help the researcher to recognize spaces tamed and/or omitted by research participants. Examination of the GPS records in terms of the point clustering may illuminate the different levels of research participants’ engagement with their surroundings, providing an opportunity to identify their meaningful locations.

What is more, overlaying an entire set of GPS records allows for comparative visual analysis of their spatial trajectories. Cross-referencing these records with additional information about the explored areas (e.g., spatial distribution of homeless services used to examine whether the institutional landscapes do indeed serve as strong anchors for the everyday homeless geographies as the literature on homelessness suggests) or the people with whom the areas had been explored (e.g., sociodemographic characteristics of the informants such as gender, age, type of homelessness, and length of a
current period of homelessness used to examine whether they differentiate the spatial footing of homeless urbanites’ daily lives) may help with determining the reasons behind the observed patterns. The last but equally important benefit of recording the routes lies in the possibility of taking these same routes once, or several times more to undertake, for example, a systematic cataloguing of the explored space or focus on the material and immaterial details of the area that may have escaped the researcher’s attention during the walks.

Clearly, the above list of examples does not provide a comprehensive review of the ways in which qualitative and spatial material generated while walking could be analytically approached. It was rather meant to raise general attention to the possibilities opened up by incorporating geospatial technologies into the methodological practice of walking, many of which are yet to be developed. Further inspirations for the emerging practice of combining the walk-along method with GPS and GIS can be found in the works of the authors of the spatial transcript technique and those who have found them inspiring (see, e.g., Bergeron et al. 2014), as well as other scholars, not necessarily walking, whose efforts have been focused on integrating geospatial data and analyses with the “ways of knowing” more familiar to qualitative modes of inquiry (see, e.g., Cope and Elwood 2009).

Conclusions and Recommendations for a Way Forward

In this article, I have tried to demonstrate what may be gained from combining the walk-along method with GPS and GIS when exploring the social and physical aspects of locally situated daily lives. I focused on the premise and application of the spatial transcript technique, which allows for an integration of qualitative and spatial material generated while walking and its subsequent visualization and analysis within GIS. I suggested that incorporating geospatial technologies into the methodological practice of walking might serve as means to operationalize particular spatial sensitivity afforded by this mode of inquiry and effectively advance its utility for yielding spatially sensitive insights.

I wish to conclude with a few remarks on the possible directions for future advancement of the walk-along method combined with GPS and GIS. First, I suggest that ethical concerns surrounding the use of GPS need to be addressed. The fact that GPS can, at the same time, be critiqued as panoptic (Propen 2006), and understood as an effective means of social critique (Parks 2001), highlights a potential abuse of power and invasion of privacy
but also suggests that GPS need not be used to “perpetuate power differentials” (Propen 2006:134) or endanger research participants by wittingly or unwittingly revealing their “near-exact location” (Propen 2006:134). Nonetheless, the question of what counts as acceptable uses of geospatial technology (Propen 2006) remains open and should be reflected on. Second, the notion of “spatial context” within GIS needs to be problematized as “the rather conventional, neo-Euclidean, physical conceptualizations of space” (Merriman 2014:180), which underpin analyses typically done in GIS, might stand against paradigmatic assumptions of many walking scholars. Thus, the possibilities of embedding typical GIS landscapes consisting of “points, lines and polygons within cartographic space” (Jones and Evans 2012:93) with meanings and affects should be further conceptualized and operationalized. For they can transform “the nominal objectivity of Cartesian cartography” (Jones and Evans 2012:94) into the conceptualizations that acknowledge social phenomena as influential forces in the production of space, allowing walking scholars to stay true to their interest in space as practiced and lived by varied social actors.

**Author’s Note**

Study reported in this article was approved by the Ethics Committee of the Department of Philosophy of the Jagiellonian University.

**Acknowledgments**

I am grateful to my homeless research partners for all their time and letting me in their lives. I am indebted to Karolina Piech for collaboration on the protocol for creation of spatial transcripts. I thank Marcjanna Nóżka and the anonymous reviewers for their helpful comments on an earlier version of this article and H. Russell Bernard for his editorial guidance.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Funding**

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Polish National Science Centre under grant no. 2016/23/N/HS6/00810.

**Supplemental Material**

Supplemental material for this article is available online.
References

Bates, C., and A. Rhys-Taylor, eds. 2017. Walking through social research. New York: Routledge.

Bergeron, J., S. Paquette, and P. Poullaouec-Gonidec. 2014. Uncovering landscape values and micro-geographies of meanings with the go-along method. Landscape and Urban Planning 122:108–21.

Carpiano, R. M. 2009. Come take a walk with me: The “go-along” interview as a novel method for studying the implications of place for health and well-being. Health and Place 15:263–72.

Clark, A. 2017. Walking together: Understanding young people’s experiences of living in neighbourhoods in transition. In Walking through social research, eds. C. Bates and A. Rhys-Taylor, 86–103. New York: Routledge.

Cope, M., and S. Elwood, eds. 2009. Qualitative GIS: A mixed methods approach. Los Angeles: Sage.

De Leon, J. P., and J. H. Cohen. 2005. Object and walking probes in ethnographic interviewing. Field Methods 17:200–04.

Evans, J., and P. Jones. 2011. The walking interview: Methodology, mobility and place. Applied Geography 31:849–58.

Hall, T., B. Lashua, and A. Coffey. 2006. Stories as sorties. Qualitative Researcher 3:2–4.

Holgersson, H. 2017. Keep walking: Notes on how to research urban pasts and futures. In Walking through social research, eds. C. Bates and A. Rhys-Taylor, 70–85. New York: Routledge.

Jones, P., G. Bunce, J. Evans, H. Gibbs, and J. Hein Ricketts. 2008. Exploring space and place with walking interviews. Journal of Research Practice 4:1–9.

Jones, P., and J. Evans. 2012. The spatial transcript: Analysing mobilities through qualitative GIS. Area 44:92–99.

Kusenbach, M. 2003. Street phenomenology: The go-along as ethnographic research tool. Ethnography 4:455–85.

Merriman, P. 2014. Rethinking mobile methods. Mobilities 9:167–87.

Odzakovic, E., I. Hellström, R. Ward, and A. Kullberg. 2018. “Overjoyed that I can go outside”: Using walking interviews to learn about the lived experience and meaning of neighbourhood for people living with dementia. Dementia. doi: 10.1177/1471301218817453.

Parks, L. 2001. Cultural geographies in practice: Plotting the personal: Global positioning satellites and interactive media. Cultural Geographies 8:108–11.

Pink, S. 2007. Walking with video. Visual Studies 22:240–52.

Pink, S., P. Hubbard, M. O’Neill, and A. Radley. 2010. Walking across disciplines: From ethnography to arts practice. Visual Studies 25:1–7.
Propen, A. D. 2006. Critical GPS: Toward a new politics of location. *Acme* 4: 131–44.

Reckwitz, A. 2012. Affective spaces: A praxeological outlook. *Rethinking History* 16:241–58.

Schatzki, T., K. Knorr Cetina, and E. von Savigny, eds. 2001. *The practice turn in contemporary theory*. London: Routledge.

Schuessler, N., and K. W. Axhausen. 2009. Processing raw data from global positioning systems without additional information. *Transportation Research Record: Journal of the Transportation Research Board* 2105:28–36.

Stopher, P., Q. Jiang, and C. FitzGerald. 2005. Processing GPS data from travel surveys. *Australasian Transport Research Forum*. https://www.atrf.info/papers/2005/2005_Stopher_Jiang_FitzGerald.pdf (accessed October 10, 2018).

Thompson, C., and J. Reynolds. 2018. Reflections on the go-along: How disruptions can illuminate the relationships of health, place and practice. *Geographical Journal* 185:156–67.

Wang, B., L. Gao, and Z. Juan. 2017. A trip detection model for individual smartphone-based GPS records with a novel evaluation method. *Advances in Mechanical Engineering* 9:1–10.