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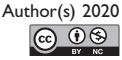
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Data with its boots on the ground: Datawalking as research method

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Abstract
This article explores datawalking as a novel method in media and communication research for studying datafication. Drawing from existing literature, datawalking is characterized as an embodied, situated and generative practice. These affordances of walking help to tackle existing research challenges and connect lived experiences to data infrastructural concerns. More specifically, contemporary research on the deep mediatized city faces challenges that pertain to the invisibility, loss of context and access to data and its infrastructures. It is argued that datawalks, as an empirical method in media and communication research, offers a much-needed anchoring of data as material and situated, and constitutive of everyday life.

Keywords
Computational turn, data infrastructures, mediatization, research method, smart city, walking

Introduction

Starting in the 1950s with the introduction of electronic computers and accelerated by the 'third wave' of mobile, ubiquitous and embedded computing and social media platforms, the computational turn unleashed a 'datafication' of culture

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and society (Van Es and Schäfer, 2017). New technical media and platforms capture nearly every aspect of everyday life in a wide variety of environments as data (Kitchin, 2014; Mayer-Schönberger and Cukier, 2013; Van Dijck 2014). Big data and data infrastructures are raising a myriad of questions about the nature of data, its deployment and rationalization (Kitchin and Lauriault, 2014: 1). For this contribution, we are interested in the implications of datafication for doing research in media and communication studies and explore *datawalks* as an emerging research method for studying data and its infrastructures. As explained in more detail below, datawalks combine purposive physical walks through the (urban) landscape with being specifically attuned to observe and reflect on the variety of processes and infrastructures of datafication as situated in time and space. As a method, it forges interdisciplinary links between media and communication studies and urban studies, where the use of walking as part of a research method has been long-established.

We argue that datawalking is a useful research method to study the computational turn in media and communication studies. As Andreas Hepp (2020) points out, media are increasingly computerized and many formerly inert objects (e.g. bikes, lamp posts and parking metres) have, by nature of their digital connectivity, been turned into media (p. 6). Aside from functioning as communicative tools, Hepp elaborates, they generate data that are automatically processed for multiple ends. This has ushered in a new stage of 'deep mediatization', 'in which all elements of our social world are intricately related to digital media and their underlying infrastructures' (Hepp, 2020: 5). For media and communication research, this means it 'must incorporate the analysis of algorithms, data and digital infrastructures' (Hepp, 2020: 6). Pervasive media permeate our social world and are actively moulding and shaping society and human practice. Datawalks, we argue, offer a much-needed anchoring for understanding data as material and situated, and constitutive of everyday life.

For the most part, media and communication research 'has tended to prioritize processes of production and consumption, encoding and decoding, and textual interpretation' (Parks and Starolieski, 2015: 5) at the expense of studying the process of distribution. To remedy this, Parks and Starolieski (2015) propose analysing media infrastructures and their materiality and situating these within systems of power. They claim that studying infrastructures requires innovative research methodologies that draw on multidisciplinary scholarship. This is where we feel that datawalks – centred on observing data and its infrastructures while moving through space – could prove productive. Drawing from ethnography, phenomenology, political economy and theater studies, datawalking allows us to empirically study how contemporary media technologies shape culture and society. Although we argue it is a useful method for generating data about the embodied and situated experiences of the deep mediatized city, it is not a standalone research method and is usually augmented by other methods (e.g. interviews, participant observation, case studies, etc.).

Boots on the ground: Anchoring data to infrastructures and everyday life

Specifically, we claim that datawalking is a useful method to tackle some of the challenges that the computational turn has presented academic research with.[1] These challenges include the *invisibility*, *decontextualization* and (lack of) *accessibility* of data and its infrastructures as objects of study. The apparent ephemerality of data makes it hard to grasp and tends to imbue it with a mythical aura, devoid of the material context and actual practices by which data are produced, selected, processed and so on. This in turn creates new thresholds for accessibility, resting on claims to ownership, expertise and data literacies. Scholars in critical data studies (CDS) have sought to engage with such issues. Rather than seeing big data as a neutral phenomenon, CDS treats it as already constituted in 'data assemblages' (Kitchin and Lauriault, 2014). More specifically, it approaches data and its infrastructures as produced and entangled in social, technical, political and economic apparatuses and elements.

For research on the datafied society, it is important to consider how data are generated, circulated and communicated in and across time and space. However, the infrastructures involved herein tend to be taken for granted and fade into the background (Star and Ruhleder, 1996), evading questioning and collective decision-making about the uses of data. Yet as Burrington (2016) proposes, 'not so much invisible as it hard to see; it hides in plain sight' (p. 13). Central to the datawalking method is *attentiveness* to data infrastructures making them visible for critical scrutiny and reflection. Rather than treating infrastructures as mere objects, datawalks question the *practices* and *effects* that they are entangled with.[2] Datawalks help scrutinize the affective dimensions of infrastructures, their ownership as well as the relations of power that infrastructures support. We suggest that datawalks can be especially useful for studying the datafication of urban life in so-called 'smart cities', where these issues play out in full (see for instance De Lange, 2019; Madsen, 2018). With sensing technologies, data collection and communication interfaces like urban dashboards, the smart city itself is increasingly being understood as a mediating platform that channels communication between technological infrastructures, citizens and urban society. Data and its infrastructures not only mediate an increasing range of everyday activities but undergird how cities function and how they are lived and experienced.

In what follows, we explore walking as *embodied*, *situated* and *generative*. These three affordances of walking, we contend, make datawalks a suitable method for studying the datafication of urban life. The affordances offer opportunities for different forms of knowledge production in media and communication studies: experiential, spatio-temporal and performative. To illustrate this, consider a possible datawalk in a train station that would include a hands-on checking-in procedure with a rfid chip card. In line with Hepp's argument about deep mediatization, datawalking allows researchers to connect everyday 'lived experience' (how does a check-in make us feel, how does it produce and aid in

performing certain situated subjectivities, for example, as a commuter, a legitimate traveller, a traceable monitored body) to underlying infrastructural considerations (e.g. where does the data go, who owns the data, what algorithmic calculations are executed, for how long is the transaction stored, how are spatio-temporal urban infrastructures like mobility reconfigured through data).

Lacing up: Datawalking as method for studying the datafied smart city

As mentioned, the computational turn presents researchers with particular challenges that the affordances of datawalks are particularly well-suited to confront. These challenges are related to the *invisibility*, *decontextualization* and *accessibility* of data and its infrastructures. First, with regard to the *invisibility,* we find that the collection, storage and analysis of data happens through various socio-technical infrastructures that are embedded in the urban landscape and tend to govern ever-increasing segments of everyday life. They tend to disappear and only get noticed when they stop working. However, making these infrastructures visible for reflection does not require breakdown (Star and Ruhleder, 1996), or mal-alignment with the concerns of the public they assemble (Gray et al., 2018), but can be achieved by paying attention to mediation when walking. Walking is a bodily experience that physically engages subjects with the topic under study (e.g. the *feeling* of being tracked). As such, datawalking approaches data (its production, its archival infrastructures, its capacity for retrieval, its potential to become actualized through processing and interpretation, and so on) as a fundamentally physical/digital hybrid. Datawalks demonstrate how myths surrounding data, perpetuated through metaphors like that of 'the cloud', as something abstract and fleeting, far removed from the material world of cables, wires and devices, are inherently misleading. Data are not loose entities in virtual space, but are embedded in material assemblages and should thus be understood as 'in-material' (Van den Boomen et al., 2009: 9).

The second research challenge is related to the fact that (big) data lose its meaning when *taken out of context* (boyd and Crawford, 2012). Data are not objective or neutral, they are partial and situated. This problem is further exacerbated by automated methods for collecting data that ignore the larger symbolic context from which the (meta)data are drawn as well as the social interpretations by users (Light et al., 2018: 885). Similarly, smart cities have been criticized for pushing a decontextualized role of technology as one-size-fits-all solutions for universal urban problems like congestion, waste management or resilience. Like cities, we hold that data cannot be studied in isolation or as abstract entities devoid of context, but are always part of wider assemblages. This is the void that datawalks help to fill. Taking place in a spatio-temporal setting, walking is emphatically situated. It serves to underscore embeddedness, context and environments when considering data.

Third, restricted *access* to data (and information on the working of algorithms) is another challenge that the computational turn presents scholars with. In part, difficulties in accessing data can be attributed to a lack of required expertise and literacies needed for scraping and wrangling data and understanding technical protocols and algorithms. However, most often it is also an issue of ownership. While social media platforms have made data available to researchers through Application Programming Interfaces (APIs) , many popular platforms are now restricting or limiting access to researchers following a series of data related scandals. It has spurred what has been called 'the post API age' (Freelon, 2018) and raised questions about the future of social media research. The datafied smart city faces similar challenges. Here too, we encounter debates about accessibility and ownership of smart city data (for instance, in terms of 'the right to the smart city', cf. Cardullo et al., 2019). This is because the data infrastructures that help to manage and control public spaces are part of private-corporate partnerships. Datawalks are a useful method for researchers to study deep mediatization because it enables creating knowledge about data infrastructures 'from the bottom-up' (Powell, 2018). Walking as a method is generative: it produces changes in the knowing subject, the object under study and the relationship between subject and object (e.g. when the researcher herself produces a data log of her walk by using an app). Consequently, scholars do not have to rely on the willingness of other parties to share their data and knowledge to conduct their research.

Currently, we see two distinct approaches in the study of the datafied society in media studies: a 'lean-back' critical data studies – more critically and theoretically orientated – and a 'hands-on' (and sometimes overly affirmative) digital methods working with empirical data. Datawalks take up an intermediate space between them as an active, research-driven empirical method. It offers a way of doing research about *and* with data, including all the rich details of empirical research, without actually requiring skills like programming or coding. Rather it draws on the critical interpretive skills that the media and communication scholar is trained in.

Stepping backwards: A short history of walking as method

There is a long-standing tradition associated with walking, among others in human geography, social science and urban studies, as a form of philosophical and artistic inquiry (e.g. Benesch and Specq, 2016; Matos, 2008; Middleton, 2010; O'Neill and Roberts, 2020; Solnit, 2001). This tradition extends from the 19th-century *flâneurs* strolling along the Parisian boulevards, through the urban explorations of Walter Benjamin, Situationist *dérives* and *détournements*, De Certeau's politicizing of walking as an emancipatory counter-tactics to the top-down urban planning strategies, Jane Jacobs' veneration of the street sidewalk as a space for encounters in motion, to more recent 'psychogeographical' artistic interventions (see for example, Bassett, 2004: 398; Middleton, 2010). While these cover slightly distinct walking practices, they share an assumption that walking produces certain effects, like creating publicness or propelling reflection. Walking harnesses critical potential for

interrogating taken-for-granted assumptions, conditions and habits (Bassett, 2004). The rise of digital media technologies allows for new modes of capturing and analysing these effects and affects, and simultaneously, shape them (O'Neill and Roberts, 2020: 31–34).

A quick foray into existing literature allows us to identify three related affordances of walking. It is *embodied*, *situated* and *generative*. In discussing the history of walking, Benesch and Specq (2016) articulate these affordances when they speak of walking as being predicated on the human body (*embodied*), being-in-motion as a form of being-there anchored in a particular place and time (*situated*), and walking as a counterspace that empowers the subject (*generative*):

> While walking body and mind join to interact with the environment, and to provide a panoply of ways – intellectual, emotional, bodily – to 'take in' and make sense of the world 'out there'. From the late 18th to the 21st century walking repeatedly figured as an alternative mode of human existence, one that is outside of the restrictions and limitations of modern life as we know it. (Benesch and Specq, 2016: vii–viii)

Likewise, Matos (2008) speaks about walking as 'an embodied practice of our everyday life' and 'a principal mode of perceiving and living (embodying) urban places', while distinguishing further between three generative walking practices: purposive, discursive and conceptual (p. 136). Purposive walking is about achieving a preset goal, discursive walking highlights the practice of doing over the system-world (similar to how discourse relates to language), and conceptual walking entails a reflective and choreographed mode of relating to the environment. Another insight is that walking is theorized as an interface that simultaneously connects and defines two or more different entities (see De Lange et al., 2019). For instance, Solnit (2001) suggests that the philosophical stance of the walker (as epitomized by Kierkegaard) entails a way of being 'both present and detached from the world around', and a way of assuaging alienation in the modern city (p. 65).

Zooming in on examples of datawalks below, we argue that the aforementioned affordances of walking offer helpful routes for researchers to generate knowledge about datafied smart cities. First, walking as an embodied practice provides a visceral means to reflect on how data, far from appearing transparent 'raw sources' to base inferences on, are in fact 'cooked' and entangled epistemologically, politically and ethically (Kitchin and Lauriault, 2014: 1). The datawalk calls out the all-too-common disappearance act of data and its infrastructures by rendering them visible, experiential, and hence, subject to critical scrutiny. Second, the situatedness of walking as an event taking place in time and space, underscores the importance of contextualizing data as spatio-temporally produced, and subject to narrativization (cf. Dourish and Cruz, 2018). Third, walking is generative in allowing participants and researchers the opportunity to *purposively* produce their own data, to generate new *discourses* around datafication, and/or providing room for alternative *conceptual* ways of making sense of data. Walking is accessible for most people

and does not rely on powerful institutional actors (e.g. local governments or commercial companies) or literacies in order to work with and get access to data.

Datawalks and the production of knowledge

Existing datawalking projects can be related to different forms of knowledge production: embodied, situated and generative. While the following datawalks draw on all three affordances of walking specified earlier, they each emphasize a specific form of knowledge production. The datawalks work from different theoretical frameworks, objectives, make-up, group composition and participant roles.

The data walkshops devised by Alison Powell at the London School of Economics and Political Science (see www.datawalking.org) emphasizes an *embodied knowledge*, what she terms 'bottom-up data subjectivity'. Her walks draw from participatory ethnography and devised performance. For Powell (2018) datawalking is 'a means of surfacing the everyday experiences and reflections that many people have in relation to data' (p. 214). It is experiential and collaborative, but also deeply reflective. Powell was initially interested in datawalks as a way to stimulate civic conversation and a counter to the rhetoric about smart cities. It, however, evolved into 'a new phenomenological experience and a way of producing alternative knowledge about the city, using performance to destabilise social hierarchy and reform the potential for collective experience' (Powell, 2018: 220). After a plenary discussion, small groups of four to five are formed. Each group decides upon a theme (e.g. ethics, surveillance, social justice) and participants are assigned observational roles (navigator, photographer, map-maker, note-taker and collector). The groups explore different areas of the city to observe, reflect and/or question theme-specific data. After 45 minutes, they return to narrate their walk to the larger group.

The Systems/Layers walk developed by urbanist Adam Greenfield and Nurri Kim (2011) centres on *situated knowledg*e about what they call 'networked urbanism'. They are concerned with how the ubiquity of networked-information processing systems (e.g. CCTV cameras, cell phones and embedded sensors) in urban spaces impacts citizenship. In groups of 15, they walk a predetermined physical area ('the box') looking for places that collect and display networked information, and places where networked information is acted on. Participants are encouraged to consider how the information layer over a particular location influences the freedom to move and act. The walk is thus directly concerned with the earlier mentioned physical/digital hybridity. More specifically, it involves participants assuming the role of an observer in a specific spatio-temporal context, in order to make tangible the abstract idea of the city as a space of control.

An example of a datawalk that foregrounds *generative knowledge* are those organized by David Hunter at Ravensbourne University London (see: http://datawalking.com/). His have been organized as part of a research project aimed at exploring data gathering and data visualization. A point of departure is the idea of the city as rich in data and exploring ways in which to probe the 'layered multi-

dimensional data space' (Hunter, 2018: 4) hidden around us. Participants work in small teams and explore an area collecting data related to their theme (e.g. fauna or noise pollution) using a variety of data methods. Over time, during multiple walks through the area, the participants collect data. Afterwards, they explore the data and consider the best way to visualize it. By gathering and communicating these data, a space is created for dialogue and criticism. These walks encourage new ways of probing and understanding the urban environment. They connect to more societally engaged and creative research practices, such as citizen sensing. Citizen sensing concerns bottom-up initiatives in which citizens take digital tools in their own hands to tackle local issues. They attend to data assemblages in *space* and *over time* by producing their own data. A well-known example from the Netherlands is *Geluidsnet*, a project by residents living around Schiphol airport, who complained about aircraft noise pollution. Being dissatisfied with the response of the state about their concerns, they created their own system for tracking and reporting noise (De Lange, 2019).

Foot forward: Datawalks as method-in-progress

Datawalks are rarely if ever used in isolation. Instead, they are often used as part of a mixed-method approach. Datawalks may comprise multiple techniques, for example, textual/visual reporting, theatrical and performative aspects, observation, and even unstructured interviewing. By discussing the example of a bicycle parking management datawalk in the city of Utrecht in the Netherlands, we aim to illustrate how datawalks help to answer – however provisional – to research questions about the impact of datafication on everyday life in the city.

During the 2018 Utrecht Data School summer school, a group of participants set out on a datawalk to explore 'counting' in the datafied smart city. They were interested in: What does the city count? How, why and with what consequences does it do so? A couple of minutes into the walk, they observed a digital sign along a bicycle path that displayed the amount of free bicycle parking places at different nearby parking facilities. The group decided to narrow down their question and focus it on this particular data infrastructure. They followed the bicycle parking guidance system to one of the nearby parking facilities. In following the signs, they were exposed to the *experience* of being 'managed' through the city (albeit on foot) contributing to a form of embodied knowledge. By paying attention, they started to see the bicycle excess and data-driven solution used to battle the problem and consider how this informational layer impacted movement through the city. At the parking facility, they conducted an ad hoc interview with an employee who they asked for information about *how* the bicycles were counted and his everyday *experiences*, or rather his situated and embodied knowledge, with the system. He explained that the system used optical sensors to detect the number of free parking spots in racks. These sensors – visibly installed in the ceiling every few metres in the facility – were pointed out to the group. They were told that so-called 'P-routes' are part of Utrecht's ambition to stimulate biking as primary mode of transportation

as the city becomes increasingly crowded. Digital signs throughout the city inform cyclists about free spots in nearby parking facilities and guide them to these locations. The observations and conversations with the employee and among the participants on the streets were moreover generative, resulting in onto-epistemological insights about the biases and distortions of smart urban infrastructures (e.g. in the miscalculation of free spaces), and therefore, the messy relationship between data and the reality it purports to represent and govern.

Crucially, datawalking requires not only that participants trod along, but also retrace their steps afterwards by narrating their experiences. It is here that the critical potential of datawalking is actualized. When the group reported back, they tapped into bigger questions of the intersection of commercial interests in public spaces, freedom of movement and ethics of data collection in mobility management and smart solutions. They reflected on how the datawalk had made the city's struggle with providing sufficient bicycle parking spaces and dealing with abandoned bikes more visceral to them. As indicated earlier, it is through attentiveness to the data infrastructure that the group started to really *feel* the problem and critically engage with it as data-driven solution for mobility management in Utrecht. In recounting their walk, they also considered the more low-tech practice of city officials who attach tags to bicycles, which enables orphaned bikes to be identified and removed in order to free up parking space. In the end, the datawalk not only raised questions about mobility and public values in bike management by the city of Utrecht, but also provided some preliminary answers regarding its role and influence on city life.

The bicycle parking management datawalk shows how the embodied, situated and generative affordances of walking connect lived experiences to data infrastructural concerns. As such, the walk offered 'bottom-up data knowledge' (Powell, 2018) about the functioning and influence of the data infrastructure. The datawalk is a method to empirically study the impact of datafication on society. As Powell explains, while the insights from datawalks do not supplant powerful corporate narratives, for instance, about friction-free smart technologies, or the supposed neutrality of platforms, they can create sites of contention by building important *alternative* and/or *complementary* narratives about the datafication of cities and everyday life. This is a way to integrate everyday experiences of datafication into a more complete and socially just media and communication scholarship on the datafied society (cf. Kennedy, 2018).

Trailing into the future

The computational turn has presented researchers with challenges concerning the invisibility, decontextualization and (lack of) access to data and infrastructures. In this contribution, we have argued that datawalks offer particular affordances that can be mobilized to address these challenges. Not surprisingly, we now also witness how the so-called walkthrough method (Light et al., 2018) is gaining traction in fields such as software, platform and data studies. These walkthroughs can be

regarded as an expanded form or walking as they simulate embodied, situated and generative forms of knowledge production. The walkthrough method proposes a 'step-by-step observation and documentation of an app's screens, features and flows of activity – slowing down the mundane actions and interactions that form part of normal app use in order to make them salient and therefore available for critical analysis' (Light et al., 2018: 882). It shares with walking an interest in staging encounters to provoke reflection and are premised on paying close attention. The walkthrough draws 'an app's system of actors' (887) to the foreground through observation. It herein provides a useful research approach to the limitations of traditional methods for interface analysis that are unable to engage with the underlying data and algorithms.

In the light of our own interest in critical data studies and urban new media, we suggest further developing the datawalk as a modular methodology. By methodology we mean the design and discussion of a research strategy, outlining the methods used and reflecting on that approach (pros/cons, biases, etc.), and its relation to the research question and the theory. In order to address various research aims and a wide range of contexts, we propose to create hands-on modular datawalks that can be easily tailored. There are numerous types of datawalks, each producing different types of data and knowledge. With a modular datawalk, one can playfully reconfigure a number of basic building blocks to emphasize either embodied, situated or generative knowledge production. These blocks include the area for exploration (pre-planned or ad hoc), the composition of the participants, assigning roles in observation (hierarchical or non-hierarchical), definition of data (open or predefined) and, most importantly, the conceptual lens through which data and its infrastructures are observed.

While studying the deep mediatization of datafied smart cities will never be an easy walk in the park, media and communication researchers may as well take their first steps there. With our contribution, we have suggested the three affordances of datawalking (embodiment, situatedness, generativity) as signposts for future itinerants. As such researchers can then pave the path to building knowledge about our datafied smart cities from the street level up.

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Notes

1. For an exploration of the pedagogical potential of datawalks for CDS, see Masson et al. (2020).
2. This is inspired by the criticism that Alexander Galloway (2012) formulated in relation to software studies, which he finds suffers from 'a problem of action'.

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