

## **Making Smart Things Strange Again: Using Walking as a Method for Studying Subjective Experiences of Smart City Surveillance**

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### **Citation:**

BUTOT, Vivien, JACOBS, Gabriele, BAYERL, Petra, AMADOR, Josué and NABIPOUR, Pendar (2023). Making Smart Things Strange Again: Using Walking as a Method for Studying Subjective Experiences of Smart City Surveillance. *Surveillance & Society*, 21 (1), 61-82. [Article]

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## Article

# Making Smart Things Strange Again: Using Walking as a Method for Studying Subjective Experiences of Smart City Surveillance

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## Abstract

Smart cities are commonly seen as places that are defined by surveillance because of their reliance on vast amounts of digital data to improve urban management challenges. Although the infrastructures and technologies that enable smart city surveillance pervade multitudinous urban spaces and everyday practices, they are often “hiding in plain sight,” going unnoticed in the bustle of everyday life. Hence, fostering research settings where citizens can productively reflect on their everyday surveillance constitutes a major challenge for the interrelated projects of doing empirical research about subjective experiences of smart city surveillance and the inclusion of citizens in smart city discussions. Drawing on walking as a method, this study attempts to meet this challenge by developing and empirically testing a methodology of purposive “data walking.” Situating the research in Rotterdam, the Netherlands, participants are instructed to identify data points for public safety purposes on a short walk through the city and reflect on their experiences. Observations and experiences of smart city surveillance are documented with photos, text descriptions, and audio notes, which are shared in real-time with researchers and provide the basis for group reflections. These walks and reflections generate rich visual and textual data that yield insights into embodied and situated constructions of smart city surveillance as an object of subjective inquiry, experiences of visibility, considerations of agency and evaluations of public safety implications. The study considers these empirical results in conjunction with reflections on the methodology, contributing to further methodological explorations for including citizens in smart city discussions and surveillance subjectivity research.

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## Introduction

In the past decade, increasing attention has been given to the surveillance implications of new modes of technology and data-intensive urban safety management advertised under the banner of smart cities (Edwards 2016; Finch and Tene 2014; Galdon-Clavell 2013; Kitchin 2014, 2016; Van Zoonen 2016).

Butot, Vivien, Gabriele Jacobs, Petra Saskia Bayerl, Josué Amador, and Pendar Nabipour. 2023. Making Smart Things Strange Again: Using Walking as a Method for Studying Subjective Experiences of Smart City Surveillance. *Surveillance & Society* 21 (1): 61-82.

<https://ojs.library.queensu.ca/index.php/surveillance-and-society/index> | ISSN: 1477-7487

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Understood as places that harness information and communication technologies (ICTs) and data for rational, evidence-driven and efficient urban management, smart cities promise new insights and interventions to solve urban safety issues. At the same time, the profusion of smart city safety technologies means that “people are now subjected to much greater levels of intensified scrutiny and modes of surveillance and dataveillance than ever before” (Kitchin 2016: 5). Although interest in smart city surveillance has yielded important insights into its premises, technologies, practices, and effects on urban management, the subjective experiences of smart city surveillance by those inhabiting these emergent environments has received little attention. Inhabitants often appear as passive receivers of surveillance technologies and policies and protective legal frameworks, and not as actively experiencing and engaging with their surveillant environment. However, insights into the experiences of surveillance in smart cities are important for locally relevant, democratically and ethically legitimate smart city practices. Indeed, there is now an increasing call to include citizen perspectives in smart city initiatives that are rebranded as “citizen-centric” (Cardullo and Kitchin 2019; Engelbert, Van Zoonen, and Hirzalla 2019; Kummitha and Crutzen 2017).

In this study, we investigate the lived realities of subjective encounters with surveillance in everyday urban living environments in the “smart” city of Rotterdam, the Netherlands. Part of a collaboration between qualitative researchers and artists, we build on walking methods to surface subjective experiences of surveillant technologies and practices that otherwise operate in the backdrop of everyday life without revealing themselves for critical reflection. In considering empirical results in conjunction with methodological reflections, the paper primarily contributes to studies of everyday surveillance encounters that have become characteristic features of contemporary urban life. More specifically, we emphasize how embodied encounters with material (in)visibilities of smart city surveillance infrastructures are key to understanding a variety of subjectivities situated in mundane urban spaces and activities.

In the following section, we first review how surveillance in smart cities has been conceptualized, before identifying important research gaps in existing research of surveillance subjectivity in smart cities. In the third section, we describe our approach to walking as a method that facilitates the production of embodied, situated, and generative experiences of smart city surveillance, as well as our collection and analysis of a variety of visual and verbal data. The fourth section presents our findings as a process of observing material manifestations of surveillance, reflecting on personal visibilities, considerations of agency, and evaluations of the affordances of smart city surveillance for public safety. In the fifth section, we conclude the paper by reflecting on the main findings in relation to the used methodology.

## Background

### *Smart City Surveillance*

The surveillance implications of smart cities have often been likened to the image of a totalizing, panoptic surveillant gaze over urban processes and inhabitants (e.g., Finch and Tene 2014; Kitchin 2014; Patricio 2017; Robb and Deane 2021; Van Zoonen 2021). The paradigmatic example of this image is that of the centralized control room, which strives for cybernetic management of the city as a system of systems by pulling data from a variety of governmental information systems and sensors integrated into the built environment, while subjecting these data to algorithmic analyses for optimal, real-time decision-making (Kitchin 2014; de Waal and Dignum 2017; Söderström, Paasche, and Klauser 2014). This ideal of a city that “senses and acts” (Neirotti et al. 2014) on the totality of its territory has been pursued in a handful of already existing cities (Gaffney and Robertson 2018) and in smart cities built “from scratch” (Carvalho 2015). On a smaller scale, however, smart city control rooms surveil bounded urban spaces associated with particular safety risks, such as nightlife districts, sports stadiums and neighborhoods with high criminality indices. Such initiatives typically involve experimentations with smart sensing devices (e.g., cameras, motion sensors, and microphones) that employ software to detect deviant and dangerous behaviors (e.g., intoxication, violence, and burglary), facilitating the exploration of real-time monitoring, emergency response, and the prevention of escalation (e.g., Campbell and Jones 2022; Meijer and Thaens 2018; Pali and Schuilenburg 2019; Schuilenburg and Peeters 2018; Van Vliet et al. 2019).

In contrast to control rooms, however, there has been relatively little attention for the more distributed and fragmented nature of smart city surveillance. While becoming more ubiquitous, fine-grained, and sophisticated, surveillance systems in smart cities often remain independently operated by different agencies that are unwilling or unable to exchange and compare information. Hence, governance in smart cities continues to consist of a multiplicity of relatively comprehensive, *oligoptic* views of specific parts of urban management (Kitchin 2014: 11). Moreover, panoptic metaphors seem inappropriate to describe the profusion of what Edwards (2016) terms “peer to peer” surveillance. In parallel to smart city initiatives pursued by governmental and corporate actors, citizens themselves engage in informal “horizontal” watching, or “co-veillance” over other citizens (Mann, Nolan, and Wellman 2003). This includes, for example, not only neighborhood watch groups using smartphone apps like WhatsApp and Nextdoor but also consumer-oriented surveillance technologies, including doorbell cameras and anti-burglary sensors (Mols and Pridmore 2019; Murakami Wood and Steeves 2021; Kurwa 2019). Moreover, just as citizens in the smart city watch each other for safety purposes, consumer technologies with surveillance capacities are also employed to “watch back,” or to “sousveil” the conduct of safety officers, the police, and private corporations (Mann, Nolan, and Wellman 2003).

Seen in this way, smart city surveillance is not just pursued by governmental and corporate actors but simultaneously emerges out of an expanding range of technologies that are developed with the promise of improving public and personal safety. “Smartness” in urban surveillance, then, has grown at least as much from “the bottom up” as from “the top down” (Murakami Wood and Steeves 2021: 150). Integrations of these manifold, disparate surveillance technologies and data streams into comprehensive, efficiently operating panoptic surveillance systems are resisted for many organizational, technical, practical, legal, and ethical reasons (Kitchin 2014). The result is that “formal,” top-down controlled smart city initiatives exist next to and without integration of a plurality of other ad-hoc, unstructured, uncontrolled, and unaccountable surveillance practices from many, and often unknown, sources. Daily life in smart cities thus takes place against a backdrop of many discrete and overlapping surveillant assemblages (Haggerty and Ericson 2000) where multiple “lines of sight” (Ball, Di Domenico, and Nunan 2016) are cast on people, behaviors, and objects. Often, these lines of sight do not connect watcher and watched in a direct way. Behind the façades of visible technologies and interfaces, smart city surveillance connects subjects to distant, invisible, and often unknown data streams and “software sorting” practices analyzing their conduct, which make it increasingly hard to consciously reflect on exposures to and engagements with smart city surveillance (cf. Ball, Di Domenico, and Nunan 2016; cf. Graham 2005).

### *Studying Subjective Experiences of Smart City Surveillance*

Most empirical research on subjective experiences of smart cities suppresses the complexities outlined above. Typically, studies ask participants to evaluate individual technologies that are isolated from their broader sociotechnical and spatial contexts, framing responses into quantifiable levels of and predictors for public acceptance and adoption of smart city technologies (Sepasgozar et al. 2019; Belanche-Gracia, Casaló-Ariño, and Pérez-Rueda 2015; Van Heek, Arning, and Ziefle 2017; Brockdorff and Appleby-Arnold 2015). When smart city surveillance is seen in its multiplicity, studying subjective experiences of it comes with an important challenge. Many of the practices and infrastructures of smart city surveillance are either invisible or “hiding in plain sight” (Burrington 2016), disappearing into the backdrop of everyday spaces and practices that are rarely reflected on consciously. Empirically studying experiences of smart city surveillance, then, necessitates research settings in which the smart city becomes an object of thought, sensitizing participants to actively reflect on their engagements with and experiences of a multitude of surveillant “smart things” in their everyday surroundings.

A few studies have taken this challenge up by simulating smart city surveillance technologies, processes, and practices to participants. Examples include visual and verbal vignettes based on different kinds of surveillance technologies (Mariën and Poels 2020) or scenarios of smart city futures (Butot et al. 2020; Jameson, Richter, and Taylor 2019), gamified surveys challenging players to identify surveillant objects in a virtual smart city (Rijshouwer, Leclercq, and van Zoonen 2022), and escape rooms with surveillance storylines (Kihara, Lomas, and Bendor 2019). Although these studies have slightly different epistemological

approaches to the phenomenon of “subjective experience,” all highlight feelings of exposure to smart city surveillance, which is experienced as opaque in its functioning (Butot et al. 2020; Jameson, Richter, and Taylor 2019; Rijshouwer, Leclercq, and van Zoonen 2022; Mariën and Poels 2020). To make sense of their uncertainties about surveillance, people differentiate between “personal” and “impersonal” data, public and private actors, and the purposes behind data collection (Van Zoonen 2016; Mariën and Poels 2020). However, results across the studies also suggest that such cognitive assessments of smart city technologies are not made in everyday life, and that most people seem to reluctantly accept surveillance because it is too pervasive to consciously reflect on all the time. With an eye on future developments, people see invasive smart city surveillance scenarios as inevitabilities regardless of their values, preferences, and priorities (Butot et al. 2020; Rijshouwer, Leclercq, and van Zoonen 2022). These results can be compared against research highlighting a “privacy paradox,” where people’s statements about valuing privacy are incongruous with their disclosure of personal information (Acquisti and Grossklags 2003). Privacy scholar Solove (2021) criticizes this idea for falsely juxtaposing broadly defined privacy values to specific, narrowly defined behaviors that are isolated from the context of ubiquitous and opaque surveillance, which quenches opportunities for effective individual agency in everyday situations.

Studies that acknowledge the multiplicity of smart city surveillance thus tend to produce results that reveal more complex reactions than mere acceptance or rejection (see also Harper, Tucker, and Ellis 2013) and alternative perspectives on seeming incongruencies between stated values and revealed behaviors. However, one drawback of the reviewed studies is that their research settings are disconnected from everyday embodied encounters with surveillance in the “actually existing smart city” (Shelton, Zook, and Wiig 2015). This is exemplified by their results, which often involve reactions that reiterate mediatized narratives of technological innovations and their societal consequences at large, rather than being grounded in concrete situations and problems in the smart city. The smart city, then, becomes a template for discussing the ramifications of societal digitalization and surveillance in general, rather than a means to foreground the lived reality of surveillance in mundane urban environments.

Noting these limitations, we propose a methodological approach that does justice to the multiplicity of surveillance in smart cities while also enabling more embodied encounters with and situated experiences of surveillance to come to the fore, thus facilitating their investigation (cf. Ball 2009; Ball, Di Domenico, and Nunan 2016). To do this, we have drawn on existing research focusing on material manifestations of societal digitalization and smart cities to devise a form of walking as a method specified to our research interests.

### *Walking as a Method*

Associated with theorists like Walter Benjamin, Guy Debord, and Michel de Certeau, walking as a method has a rich history in academic, artistic, and political praxis (Kowalewski and Bartłomiejewski 2020; Wood 2010; Bassett 2004; van Es and de Lange 2020; Middleton 2010). Our aims are most closely aligned to walking as a mode of phenomenological inquiry that foregrounds multisensory observations of material environments, enabling critical reflection on taken-for-granted assumptions, conditions, and habits reflected in elements of urban landscapes. These affordances have recently inspired uses of walking that inquire about the infrastructures, technologies, and data underpinning ideas and practices involving the “smart” organization and management of cities. Labeled as “data walking” and “data walkshops,” this usually involves walking through urban spaces with attentiveness to material manifestations of data infrastructures, stimulating critical reflection on smart cities and their implications (Powell 2018; Van Zoonen 2021; de Lange and Baibarac-Duignan 2022; van Es and de Lange 2020).

Van Es and De Lange (2020) argue that walking affords the production of embodied, situated, and generative knowledge. As an embodied practice, walking provides a visceral means of reflecting on the production and experience of smart city surveillance, which otherwise evades conscious reflection. Embodied knowledge thus affords a welcome shift from realist empirical accounts that reduce “experience” to quantified cognitive evaluations of acceptability (cf. Harper, Tucker, and Ellis 2013; cf. Van Heek, Arning, and Ziefle 2017). Relatedly, walking enables the contextualization of smart city surveillance as spatiotemporally produced. As such, walking has the potential to surface embodied experiences that are



situated in particular spaces and temporalities striated by concerns about public safety and surveillance, rather than those informed by mediatized controversies around societal digitalization. Walking can thus be seen to foster affective and embodied consciousness of a shared presence with data streams and surveillance in the smart city (cf. Ball, Di Domenico, and Nunan 2016). Lastly, the notion of generative knowledge indicates that data walks foster opportunities for forming alternative discourses and practices around urban datafication (van Es and de Lange 2020). In relation to our aims, generative knowledge could entail alternative framings of urban safety and its management through smart city surveillance.

Explorative uses of walking as a method thus resonate with our empirical interests in drawing out concrete, embodied, and situated experiences of smart city surveillance for public safety purposes, and with the related project of including citizens in smart city discussions. To realize these affordances, we combine purposive, instruction-based walking, individual photographic and verbal documentation of observations and experiences, and group reflections on the outcomes of the walk.

## Methodology

Our fieldwork was situated in the city of Rotterdam, the Netherlands. The municipality of Rotterdam has pioneered safety and livability politics in the Netherlands since the early 2000s, and the city harbors many forms of surveillance that resonate with our prior descriptions of the fragmentation of surveillance. The municipal safety program focuses on the engaging with citizens and businesses; promoting resilience against criminality, polarization, and radicalization; and striking a balance between stimulating and delimiting “urban vibrancy” (Gemeente Rotterdam 2018; cf. Boutellier 2005). Rotterdam’s safety policy is driven by the improvement of area-based safety scores, measured by a statistical tool called the “neighborhood profile” (see Noordegraaf 2008 and Uitermark, Hochstenbach, and van Gent 2017). While this “management by measurement” (Noordegraaf 2008) itself can be seen as a precursor to smart urbanism, “smartness” in the domain of urban safety management is mostly pursued implicitly in a host of surveillance technologies that are barely mentioned in formal policy. This includes ongoing efforts to digitalize and rationalize municipal safety practices (De Haan and Butot 2021), the deployment of “scan cars” equipped with 360-degree CCTV, and the experimental deployments of sound and motion detection sensors and pattern-recognition algorithms to prevent burglaries (Van Vliet et al. 2019; Inbraakvrije Wijk 2021). Moreover, many citizens in Rotterdam participate in WhatsApp neighborhood watch groups, often involving auxiliary technologies like doorbell cameras (De Haan and Butot 2021; Mols 2021), and sousveillance practices increasingly catalyze disputes between the police and local activists (e.g., NOS 2021).

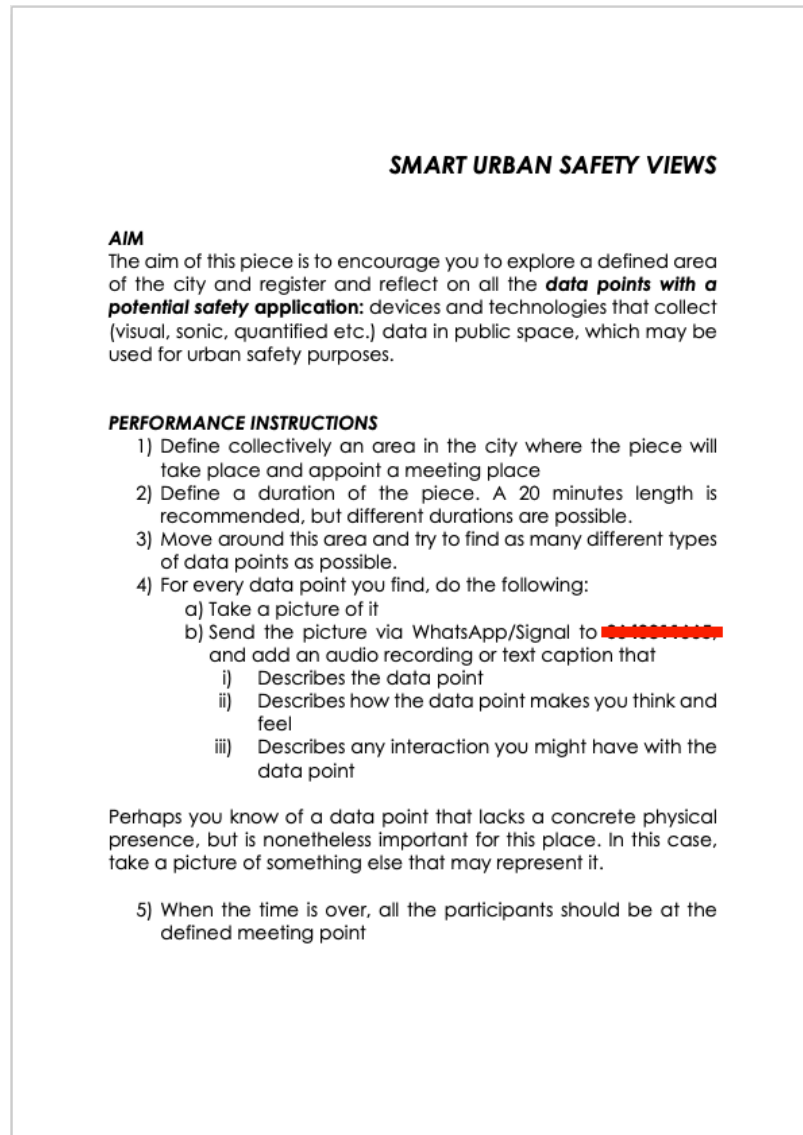
### *Design of Instructed Data Walks*

We devised a series of instructions for walking, intended to draw our participants’ attention to manifestations of surveillance in urban space and to stimulate reflection, thereby activating potential latent perceptions and experiences (Figure 1).<sup>1</sup> Participants were instructed to walk from a pre-agreed meeting point to an end point. The route was not defined; participants were verbally encouraged to wander freely, as long as they would reach the destination in time. Participants were also asked to identify and take pictures of “data points” with a potential safety application using their smartphones. This can be seen as an instruction for sousveillance, “a technique for inquiry-in-performance” to uncover surveillance and locate it in the observable, in the process enhancing participants’ abilities to collect data about their surveillance (Mann, Nolan, and Wellman 2003: 333). The instructions also sensitized participants to the possible

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<sup>1</sup> Part of the collaboration between artists and social scientists in this research revolved around different disciplinary interpretations of the methodologies used. The design of the walks was inspired by *event-scores* used in experimental art (see Kotz 2001), which have also informed participative urban planning practices in the 1970s (Halprin 2014; Hirsch 2011). The walks themselves were interpreted as open-ended performance pieces intended to surface lived realities and sense of place. This represented an interesting collaboration in the context of the Rotterdam Arts Science Lab, a larger transdisciplinary collaboration between the Erasmus University, Codarts, and the Willem de Kooning Academy. While the project led to interesting methodological and interpretive exchanges between different disciplines, in this paper, we pragmatically chose an academic vocabulary to describe the research.

existence of data points that lack visible presence. Participants were asked to complement the pictures of identified data points with written or audio-recorded (1) descriptions of the data points, (2) reflections on feelings and thoughts triggered by identifications of the data points, and (3) reflections on possible interactions with the data points. Finally, the pictures and textual or audio-recorded reflections—henceforth referred to as “documentations”—were instructed to be sent to a designated phone number through instant messaging apps (WhatsApp or Signal).



**Figure 1:** Instructions handed out to participants.

### *Data Collection*

A series of eight walks in groups ranging between two and four participants were organized in the city center of Rotterdam and in the Western district of Rotterdam. These areas were chosen for their high density of (features of) observable surveillance infrastructures and because of their problematization in municipal safety policy. Participants were recruited through calls placed on a temporary website dedicated to the project, through social media, and by asking acquaintances and students from the educational institutions with which the researchers are affiliated. Because we were also interested in the perspectives of safety

professionals, we organized one walk with three municipal safety officers.<sup>2</sup> We ended up with a varied group, representing a breadth of civic and professional experiences of smart city surveillance in Rotterdam (Table 1). In line with our research objectives, recruitment of new participants continued until a point of saturation was reached in the diversity of participants' accounts (Starks and Trinidad 2007).

Ethnicity		Gender	
Dutch	4	Male	14
Dutch-Mollucan	1	Female	9
Dutch-Ethiopian	1	Non-binary	1
Dutch and Kurdish	1		
German	1	Age	
Finnish	1	18 - 25	3
Eastern European	1	26 - 35	12
Greek	1	36 - 45	8
Indian	1	46 +	1
Spanish	1		
Afro-Caribbean	1	Education	
Capeverdean	1	Vocational	3
Somalian	1	College +	21
Curaçaoan	1		
Latin American	1		
Mexican	2		
Canadian	1		
Javanese-Surinamese	1		
Other	1		
Unknown	1		

**Table 1:** Overview of participants (N = 24).

Participants were asked to first read the instructions, handed to them in printed form (Figure 1) or through instant-messaging. In keeping with other forms of data walking (Powell 2018), we also asked participants to briefly reflect on their understandings of “data.” Together with the definition of “data points” provided in the instructions (Figure 1), this helped participants to get a grasp on the subject of interest without enforcing a strict definition of our own. After these preparatory explanations and discussions, participants started their walks individually or as a group. During the walks, the lead researcher received participants' documentations in “real time.” The walks had a duration of twenty to forty minutes, reflecting the disparate routes participants took between the data points. On arrival at the final destination point, participants were asked to collectively reflect on the walk and the documentations that stood out most to them. The duration of these reflections ranged between forty and ninety minutes. The choice for small group sizes was made to enable as much input from individual participants as possible during these reflections.

<sup>2</sup> In many Dutch cities “special investigation officers” complement police work. These officers can control identification documents, arrest suspects, and write process reports and fines. In this paper, we refer to these officers as municipal safety officers. These officers were recruited through prior contacts with the municipality of Rotterdam.



## Data Analysis

The walks and reflections yielded a rich body of data. In total, participants took 177 pictures of surveillant objects, most of them accompanied by descriptions in text and voice clips. All audio-recordings (documentations and group reflections) were transcribed verbatim and loaded into qualitative data analysis software (Atlas.ti).

Our analysis was driven by four sensitizing research questions:

1. How is surveillance in the smart city noticed?
2. How are personal visibilities to surveillance experienced?
3. How is surveillance in the living environment interacted with?
4. How is surveillance subjectively related to notions of urban safety and its management?

All visual and textual data were analyzed using inductive, open coding with attentiveness to what participants observed and how they reflected on these observations. As the number of codes increased, they were clustered or merged in cases of high thematic similarity. In this way, the coding process unfolded as an iterative process of selectively applying existing codes, creating new codes, and merging and clustering codes. In the second phase of the analysis, codes were reviewed and compared for co-occurrence with other codes to find shared patterns in the accounts that participants formed to characterize their experiences of smart city surveillance (Table 2). While the coding was principally done by the first author of this paper, regular meetings took place where the broader research team discussed the codes, their interpretations, and their eventual analysis and write-up, which provided validation of the analysis through investigator triangulation (Denzin 1978).

## Results

From the coded material, we reconstructed fourteen interrelated typical accounts that participants used to describe their experiences of the walk. These accounts are placed into four overarching themes that follow our sensitizing research questions, and which we interpreted as a generalized process of observing surveillance, reflecting on personal exposures to surveillance, considering agency, and evaluating the implications of surveillance for urban safety (Table 2). In this section, we will explain each of these themes in more detail by drawing on their constitutive participant accounts.

Theme	Participant Accounts	Contains References to...
<b>Observation</b>	<i>"I'm not sure if it's a lamp or a camera"</i>	Outer appearance and visibility of surveillance technologies in their socio-spatial environment
	<i>"If you don't pay attention to it, you don't see it at all"</i>	Remarkability and awareness of surveillance in urban space
	<i>"Belongs to the city I guess"</i>	Differentiating between public or private ownership of surveillance equipment
	<i>"Could this be for a private company?"</i>	Plausible integrations of systems of infrastructures and data
	<i>"This is probably connected to some kind of nerve center"</i>	Limitations to knowledge about surveillance in everyday environments
<b>Exposure</b>	<i>"I think I know Rotterdam pretty well, but this world I don't know at all"</i>	
	<i>"You just know that you're being watched in some way"</i>	Generalized feelings of visibility, being watched, followed, tracked, monitored, being "known"
	<i>"Do I fall into line? Do I exhibit deviant behavior? Am I doing something that could provoke an intervention?"</i>	Self-awareness about identity and behavior when becoming aware of surveillance
	<i>"I'm not sure if then I'd be watched more closely, if that's seen as suspicious"</i>	Social and legal sanctioning of suspicious or dangerous behavior in the smart city

<b>Agency</b>	<i>“More careful in my coming and goings”</i>	Individual behavioral adaptations; minimizing or maximizing conspicuousness and exposure
	<i>“I have to let go of the feeling that I can’t be followed”</i>	Ubiquitous surveillance and limited opportunities for avoidance
	<i>“It’s kind of conditioned in the way that we live”</i>	The gradual integration of surveillance technology into everyday life; social conditioning of and dependence on their use
<b>Evaluation</b>	<i>“If something happens”</i> <i>“It works as a means of deterrence”</i>	The effectiveness of surveillance as a deterrent for illicit behaviors or in producing a record of transgressive or criminal behaviors
	<i>“Many issues that the police deal with are a result of social problems”</i>	Social problems underlying urban safety issues; surveillance as symptom-treatment
	<i>“Everything is for money at this point”</i>	The dominance of commercial profit as a motive for surveillance; ambiguity about surveillance purposes

**Table 2:** Themes and participant accounts.

### Setting the Context: Observing Smart City Surveillance

Participants often found more surveillance in the city than they had expected. Collectively, over fifty different objects associated with data collection and surveillance were photographed. CCTV cameras emerged as the primary markers of surveillance and data flows in the city (see also Van Zoonen 2021). Other commonly observed data points include public transportation information panels, smart card readers, parking meters, electric vehicle charging points, electric rental scooters and bikes, public Wi-Fi networks, smartphones, and digital information and advertisement panels.

The walks made participants aware of ordinary encounters with surveillance in the city, which they do not pay much attention to in everyday life. The purposive aspect of walking gradually sensitized participants to look for surveillance where they would not look for it otherwise, sometimes leading to progressive suspicions of potential surveillance. Unusual outer appearances of observed objects and infrastructures fed into this suspicion. For instance, one particular CCTV camera (Figure 2) stood out because “it looks super heavy-duty... it’s like two times or four times the size of a normal camera and looks like a space ship.”



**Figure 2:** Unusual outer appearances of observed objects and infrastructures: (left) “intense—the size is different and there are spikes so humans don’t climb”; (right) “curious stop.”

Some participants attributed potential surveillance capacities to objects they could not immediately identify based on their outer appearance. On several occasions, for instance, participants were not sure if what they saw were cameras or lamps. One participant aptly documented that CCTV cameras are “kind of as common as street lights, or as windows in the buildings, they’re everywhere.” Nevertheless, the relative inconspicuousness of surveillant technologies in everyday life were seen as a cause for what most participants saw as a paucity of public awareness of surveillance (Figure 3 and Figure 4).



**Figure 3:** Inconspicuousness of surveillant technologies: (left) “video, vigilance, no interaction”; (right) “unnoticed.”

V: *So the first one you took is this one.*

P009: *Yes, I’m not sure if it’s a lamp, or a camera.*

V: *It’s in the one in the distance, right? Can you explain your description a little bit?*

P009: *Yeah, I mean uhm... this of course is video recording the street. Uhm, I have another photo of a camera where I put “unnoticed,” because uhm, they are very much in the same shape, color and whatever of the lamps. [...] and uhm... yeah, no interaction because most of the people don’t even realize they are there, I think.*

V: *So is it unnoticed by other people?*

P009: *No, it’s not for everyone. I mean I realized it because I was looking for them. [...] Otherwise no. I mean I used to realize the big white, and in the middle of the street with a big case... on the floor, but with this ones it’s like... now I know where is cameras. And they’re a lot, now that I realize, now that I was looking for them, like, I mean I’m not taking pictures of all of them. Every hundred meters there are cameras.*

**Figure 4:** A reflection on the surveillant technologies depicted in Figure 3.

By paying closer attention to surveillance, participants viscerally experienced the material ubiquity of surveillant infrastructures in their daily environment. This environment was often made sense of by differentiating between public and private ownership. “City cameras” were contrasted to private cameras from companies, small businesses, and home-owners. The profusion of private surveillance (cameras and doorbell cameras) made some participants especially wary about a “securitization” of the city and adherence to and enforcement of privacy regulations supposed to protect citizens. Moreover, many participants actively made inferences about what was not immediately visible: the kinds of data involved, invisible data streams linking into larger “networks” or “nervous systems,” and software-enabled analyses and applications.

However, viscerally experiencing ubiquitous surveillance made most participants reflect on the limitations of their knowledge over matters of ownership, functionalities, and precise purposes of surveillance. Often, this led to a palpable sense of not knowing “this world” at all. Thus, by overcoming the “disappearance act of data” (van Es and de Lange 2020), the walks made the opacity of smart city surveillance physically obtrusive.

### *Exposure to Smart City Surveillance*

As we expected, many participants indicated they were potentially being watched. While the opacity of surveillance often made this sense of visibility rather tacit, a few participants described a frequent sense of being marked as suspicious on the basis of their embodied identities. For these participants, the possibility of surveillance by public authorities, private security personnel, and other citizens is internalized as common, everyday experience. These participants shared vivid experiences of bodily self-awareness, which can momentarily interrupt the regular flow of movement through spaces where one’s embodied identity could potentially stand out, such as being black or brown in a store, or wearing street fashion and having tattoos when admiring houses in upscale neighborhoods. One participant documented the observation of a CCTV camera above a subway exit as follows: “there is a camera, bang! on the stairs, when you come up, directly your whole face, everything is recorded.” In recounting their actual and anticipated profiling on the basis of their embodied identities, these participants said that encounters with technologically mediated surveillance produced similar kinds of self-awareness. In these cases, then, walking draws attention to the ways that embodied subjectivities, intertwined with an awareness of surveillance may restrict uninhibited movement through specific urban spaces.

During the reflection on the walk with municipal safety officers (Figure 5 and Figure 6), however, it became clear that a sense of self-awareness was also influenced by intersecting civic and professional subjectivities.





**Figure 5:** (left, P025) "Camera, makes you aware that you're being watched, more careful in my comings and goings"; (right, P024) "Cameras. Gives a feeling of safety to some people, while others feel watched and monitored by it [...] Personally, I like the feeling. A kind of feeling of being watched along."

V: P024, you took pictures of surveillance cameras, and what I found interesting is that they gave you a positive feeling.

P024: I think that it depends on the person, of course, how you experience life, and as a safety officer I'd like it if someone would watch along with that camera. But if I would have something to hide, I can imagine I'd rather not have that. [...] When we come with our bodycams you can see the light blinking because it's on standby, yeah, then immediately these youngsters pull up their hoodies and disperse. [...] Like I said, if you've got something to hide, you'd rather not have it, and if you're a normal citizen, yeah, you'd think it's fine.

V: And P025, you took a picture of the same camera [...] but you said it makes you pay more attention to your behavior.

P025: That's right. I'm more aware that someone is watching along, and I don't know, I think it gives me a feeling [...]. It's really the same as when [...] you're driving on the highway and you see police behind you, and you check if your seatbelt is on, even if there's nothing particular going on. I get that feeling when I'm aware of a camera. [...] And before you see the camera you never really become aware of it. Do I fall into line? Do I exhibit deviant behavior? Am I doing something that could provoke an intervention?

P024: Also, when taking pictures of those cameras, I had the idea like it could be they're noticing that I'm taking pictures.

P025: *I had the same.*

P024: *And that's suspicious. You know, like could that be something? [...]*

V: *Is this a distinction between your perspective as a professional and as a citizen? [...]*

P024: *Yes, but it's a fine line, because as a professional you're also being watched, of course. Are you doing everything by the book? Am I not going too far? Those kinds of things.*

V: *So, falling into line also applies to a safety officer.*

P025: *Yes. It's very topical too. Everybody has an opinion, and there are cameras everywhere. It depends on your perspective on the situation. There are many situations where only afterwards it appears to have been filmed, but the context is gone, and then you have to defend yourself.*

V: *This is about citizens filming?*

P025: *Yes, citizens filming and uhm, that gets posted to social media and everybody has an opinion on it, but they don't see what leads up to the situation, what it was all about in the first place.*

**Figure 6:** Reflections on embodied subjectivity.

This exchange illustrates how the group reflections further contributed to drawing out differences between individual perspectives and to surfacing experiences not immediately recounted in the walks. In this excerpt, exchanging different interpretations cascades into reflections on exposures to surveillant gazes from a multiplicity of others (safety officials as colleagues, authorities, or other citizens) on intersecting embodied professional and civic identities. This involves a recounting of the ambiguous effects of surveillance in heightening a visceral sense of awareness about falling “into line” or “doing everything by the book” in terms of ordinary civic behavior (wearing a seatbelt), professional performance (“not going too far”), and safety at work (“being watched along”). These navigations of exposure to surveillance become more complex when recounting experiences of sousveillance of professional performance and integrity, and the (public) struggles over interpreting surveillance data.

Lastly, this long excerpt also shows uncertainty about what kinds of behaviors are legally and socially sanctioned or qualified as suspicious. For a few participants, the novel experience of photographing surveillance felt like a deviant, subversive, and thus potentially suspicious activity. Sometimes this prompted discussions on behavioral normativity and control in the smart city, for instance involving the curtailing of opportunities for deviating from a perceived “regular” flow of purposive, mostly consumptive behavior (e.g., shopping, eating out, commuting).

### *Agency in the Smart City*

Only a few participants shared experiences of behavioral adaptations in reaction to noticing surveillance in everyday life. This includes the aforementioned interruptions of bodily movement and self-checking to ensure the accommodation of context-specific norms. These participants spoke of “becoming more careful in my comings and goings,” minimizing conspicuousness by blending in with the crowd. Conversely, a few participants, mostly young women, indicated they sometimes sought exposure to surveillance when they felt unsafe, for instance by walking in the purview of CCTV or taking well-lit routes at night.

However, agency was addressed differently by recounting the difficulty of avoiding surveillance, especially when considering the wider range of data points beyond CCTV cameras. While there were several examples of active avoidance (e.g., public Wi-Fi networks or shared mobility bikes and scooters) (Figure 7), for many participants avoidance amounts to merely “a semblance of a lifestyle that is not completely immersed in



technology.” Many felt they were always inside a “network,” that surveillance is “fully integrated” into everyday life, and that they needed to “let go of the feeling that I can’t be followed.”



**Figure 7:** Avoidance of smart city surveillance: “Wi-Fi hotspot. Data, internet traffic. Interaction: trying to avoid them.”

The integration of a multitude of surveillant technologies into everyday life was most vividly expressed by mentioning the social conditioning of and collective dependence on digital technology at large (Figure 7 and Figure 8).

P010: [...] *All our cell phones for example are connected in the same whatever mobile tower network, you know [...] So there is a record of where we are located, you know. There is a record of all the network that we passed during our journeys...*

J: *Is there anything you do to...*

P010: *To minimize that?*

J: *Yeah.*

P010: *I try to... well, the problem with this is that it's kind of conditioned in the way that we live, that's the problem you know, cuz... can you have a job without WhatsApp anymore? [...] If you go to your job and say guys, I don't use smartphones, because I'm against data collection [...] are they gonna understand your point and try to cooperate? No, they tell you man just shut the fuck up, get a smartphone!*

**Figure 8:** Reflection on social conditioning and dependence.

From this perspective, the nominal voluntariness to “opt-in” to smart technology usage masks the collective processes that condition the usage, or refusal, of surveillance. When faced with dilemmas of opposing to the coercive character of surveillance, while at the same time participating in a technologically advanced urban society, conditioning and dependence trumps individual preference and leads to a sense of resignation. Conversely, the unavoidability of surveillance in the smart city was sometimes also seen as productive for a necessary degree of governance in a densely populated territory. For many participants, however, temporarily not being a part of the smart city remains a cherished desire. In this case, avoiding surveillance in the smart city also becomes a question of avoiding mass urban society.

### *Evaluating Implications for Safety*

Visible surveillance was often seen as a deterrent for criminal activity or for “socially unsanctioned behaviors.” In some cases, the signaling function of CCTV cameras was seen as a substitute for the absence of people and oversight, for instance in underground subway stations, tunnels, and empty, badly lit streets at night. Some participants explained that “as a woman,” their embodied subjectivities influence considerations for safety, their movement through particular spatiotemporal urban contexts and the role smart city surveillance might play therein. However, women also doubted the effectivity of such signaling functions to mitigate threats in the moment they take place. Affordances of surveillance for public safety were deemed more realistic for investigative purposes, after “something happens.” Surveillant technologies with no direct bearing on safety, including public transportation smart card readers and electric rental scooters, were photographed because participants argued the data they generate could be useful in retrospect (Figure 9). Sometimes, observing the ubiquity of surveillance also engendered expectations of having disposition over data records in cases of personal harm, even if participants acknowledged the incommensurability of these expectations with their own critical appraisals.



**Figure 9:** Data points for potential investigative purposes: “Meter. Is also data storage. With that data they can record where you are and how long you have been there. So, in that way they can also track how you move.”

For example, many participants considered surveillance in relation to fundamental causes of urban safety issues. Poverty, inequality, and the withdrawal of social programs under austerity policies were put forward as issues that smart city surveillance does not address (Figure 10).

P027: *Many issues that the police deal with are a result of social problems. So, when social infrastructures are torn down and the government retreats [...] you just get a whole load of social problems, and if you don't solve those problems adequately, the [surveillance] infrastructure that has been implemented can also be used to control people in certain sectors. So, you have a camera at the bridge, in dystopic perspective, and that is the entrance point to Delfshaven [an area in Rotterdam].*

P026: *Yeah, on that side over there.*

P027: *Yeah, exactly. The entrance point to Delfshaven.*

P029: *As soon as you get there...*

P027: *Exactly, you know, it's like an invisible checkpoint in that way, like where you're moving to and from. So, if that trend continues, at a certain moment, you know, the untouchables, a kind of layer in society, then it's very handy that you have all those instruments in place [...] I'm really for a universal basic income, you know.*

P029: *Me too!*

P027: *If everybody, you know, I'm like, uhm...*

V: *Then problems will solve themselves?*

P027: *Exactly.*

P029: *Certainly.*

P027: *And then you'll get a bunch of professionals who'll just don't know what to do anymore. And maybe instead of developing security tools they'll start fingerpainting or something [laughs]*

P029: *With their basic income [laughs]*

**Figure 10:** Reflection on the social problems underlying urban safety issue.

Government withdrawal from districts with high poverty rates and the expansion of surveillance infrastructure are interpreted as intensified discrimination of marginalized groups. Infrastructures of smart city surveillance thus act as a foundation for opportunistic usage by political and corporate elites to control populations. Conversely, progressive measures like universal basic income are seen as addressing the problem of poverty directly. Resonating with critiques of technological “solutionism” (Morozov 2013) and ignorance of structural urban problems, this example indicates that the walks generated alternative discourses on smart city surveillance and safety management.

We found another example of such generative knowledge when participants cautioned, sometimes cryptically, against the involvement of commercial interests and purposes in urban safety management and surveillance (Figure 11). Walking through the city center and Western district, some participants reinterpreted the efficiency and safety purposes of traffic cameras and public transportation information

panels as a selective capturing, representation, and reinforcement of aspects of urban life that serve the optimization of the city as a space of commerce and profit.



**Figure 11:** *Commercial interests and purposes in urban safety management and surveillance: “Follow the money.”*

Moreover, participants also reinterpreted smart city surveillance as a process driven by technological ingenuity and political-economic relations that are dominated by the private interests of corporations selling surveillance technologies and knowhow. One participant described this as a mistrust of “the whole structure of power and money flow and everything, [that] dictates who uses that, who sells it, who profits.” Ultimately, then, differentiations between private and commercial purposes and purposes of public safety became blurred, contributing to a sense of ambiguity about whose interests are truly served by smart city surveillance practices ostensibly meant for public safety purposes.

## Discussion and Conclusion

This study explored subjective experiences of smart city surveillance by devising a specified form of walking as a method. We described the results as a process of observing material manifestations of smart

city surveillance, reflections on the exposure of embodied identities and behaviors, considerations of limited agency, and evaluations of the affordances of surveillance for ensuring personal and public safety in the city. Within the accounts, we found various embodied and situated experiences and generative knowledges that yield a substantially different view on subjective experiences of smart city surveillance than public opinion polling and technology acceptance research. Moreover, we also found our results to be more specifically tied to embodied, lived experiences and sense of place in the smart city than the more generalized types of reactions elicited in prior smart city subjectivity research.

Walking with attentiveness to urban data collection enabled participants to sense a ubiquitous world of opaque surveillance operating in familiar spatial settings and everyday urban activities. This was experienced as a palpable, physically obtrusive sense of opacity in environments that were otherwise well-known. Participants specified generalized feelings of exposure as lines of sight on intersecting bodily, civic, and professional identities in particular urban spaces and temporalities. Observant walking and collective reflection also contributed to questioning taken-for-granted normativities embedded in urban environments. Rather than making tradeoffs between generalized values of privacy and public safety, participants highlighted how noticing surveillance interferes subtly with bodily movement, engendering the accommodation of context-specific norms. Although some individual strategies for minimizing or maximizing exposure in particular situations were shared, the ubiquity and social conditioning of surveillant technologies contributed to a sense of unavoidability of surveillance in everyday urban life. Lastly, in evaluating the affordances of surveillance for public safety purposes, safety was seen as a variable, spatiotemporally contingent quality that is mostly incidentally accommodated by surveillance. More fundamentally, the walks contributed to the generation of alternative discourses in which public safety issues are described in terms of socioeconomic, ethnic, and cultural inequities, while casting surveillance as a profitable strategy of urban management and control, rather than a viable solution to urban issues.

In conclusion, then, we submit that walking methodologies can productively be used to remedy what Murakami Wood and Steeves (2021: 150) call the “(hyper)normalization” of “smart things” in our daily living environments. Walking has the benefit of critically engaging citizens with a phenomenon that is otherwise mainly discussed in “expert” communities of technologists, administrators, and academics. Many participants started out with a reserved attitude towards our research interest and method. However, the act of walking, repeated encounters with surveillance, iterative individual reflections, and exchanges with other participants decidedly changed initial reservation into surprise, uncertainty, frustration, realization, and resolve with regards to the ubiquity of smart city surveillance and its social, ethical, and political implications. For us and our participants, then, walking was an effective, relatively accessible means to “make smart things strange and troubling again” (Murakami Wood and Steeves 2021: 150). In keeping with Murakami Wood and Steeves’ (2021) intervention, we believe that our findings demonstrate that walking provides a productive counterpoint to boosterist tendencies in smart city discourse and practice by surfacing embodied, lived experiences of citizens inhabiting actually existing smart city environments.

However, reflecting on our usage of walking, a few additional reflections are in place. First, employing walking methods requires consideration of the ways that the possibilities and limitations of walking through urban space itself are influenced by people’s embodied subjectivities. As feminist scholars have shown, one’s gender expressions, physical abilities, skin color, and religious conduct are but a few dimensions of embodied subjectivity that significantly enable or constrain movement through or occupation of specific urban spaces (e.g., Wilson 1992; Nairn 1999; Hinger 2022; Warren 2021). While our study assumed participants who were physically and emotionally able to join our walks, we believe other, potentially less mobile embodied subjectivities can be accommodated in adaptations of our method. Depending on the particular embodied subjectivities of interest, researchers could allow for extra time, or provide additional physical or emotional support to participants. Researchers interested in embodied subjectivities whose mobility is significantly constrained because of physical or perceptual barriers to walking in the city could use other methods, such as diary keeping, alongside walking to also accommodate relations between smart city surveillance and stasis (cf. Warren 2021).



Moreover, a second consideration involves dealing with idiosyncratic interpretations of walking instructions by participants. While our presentation might suggest a strict protocol for walking and a smooth uptake of our instructions, in reality there was a great degree of freedom for participants to interpret the instructions and engage in the walk in their own ways. Many participants took significant detours, behaved unexpectedly by drawing in bystanders (e.g., shop owners with visible surveillance equipment in their stores), and produced documentations that did not necessarily follow the structure we suggested. Rather than compromising the continuity of our empirical data, we welcomed such deviations as they enriched the diversity in perspectives participants shared with us. We believe researchers interested in using walking methods for studying subjective experiences of surveillance should be ready to accommodate a relative degree of freedom for participants within instructions that are defined for pragmatic reasons.

Third, with regards to the consequences of our method, a few ethical considerations are in place. While sousveillance of surveillance infrastructures is not illegal in the Netherlands, a few of our participants indicated slight feelings of discomfort with what they perceived as behavior that could potentially be seen as deviant and subversive by authorities. Relatedly, as we hope our results show, walking with attentiveness to surveillance changes experiences of mundane environments; for many, including the members of the research team itself, this was truly a transformative experience. However, engaging in sousveillance and heightening awareness of surveillance could trigger unsettling experiences. The sharing of individual experiences in collective reflections mitigated these potential negative consequences by allowing participants to feel heard and understood while also allowing room for the acknowledgement of differences in experiences. Although the disruption of daily environments and routines partially constitutes the power of our method, researchers should take care that the result is an enriching and not a threatening or alienating experience for participants. This may be the case particularly where walking explorations take place in participants' everyday environments or in environments that may be perceived as unpredictable or unsafe. Collective reflections with and between researchers and participants such as used in our case provide a possible means to mitigate such potential negative consequences, as may additional offers for aftercare in cases where researchers propose more confrontational walking paths or tasks than we did in our study.

Taking these considerations into account, we advocate further explorations of walking methodologies in surveillance studies, both as an empirical research method and as possible tools to foster public awareness, critical reflection, and politicization of smart city surveillance. Further investigations in surveillance subjectivity research could focus on, for instance, more specific kinds of experiences (e.g., exposure, agency, or evaluation), urban spaces (e.g., shopping districts, residential areas, "criminogenic hotspots"), and technologies. Potential adaptations of walking methods could also focus more explicitly on specific embodied subjectivities that may be of concern, including those who are less mobile for a variety of reasons (cf. Warren 2021). Moreover, while our walks mostly activated the "distance senses" of sight, and to a lesser extent also hearing, adaptations could also stimulate the "proximity senses" of smell and touch (cf. Brighenti 2007; cf. Sexton et al. 2017). Especially as public safety management and surveillance are now increasingly employing new kinds of olfactory and tactile sensors, data, and interventions (Meijer and Thaens 2018; Pali and Schuilenburg 2019; Schuilenburg and Peeters 2018), exploring the role of non-visual sensory factors could yield interesting insights on subjectivity in contexts of ongoing "smartification" of public safety management.

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