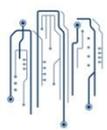


Rhythm-making, halfway ethnographies and ‘city heartbeats’

Claudio Coletta

National University of Ireland Maynooth, claudio.coletta@nuim.ie



The Programmable City



The Programmable City Working Paper 32

<http://progcity.maynoothuniversity.ie/>

9 June 2017

Published as an open access pre-print on SocArXiv: <https://osf.io/preprints/socarxiv/ydut4>

Abstract

This paper explores the issue of temporality in undertaking ethnographic fieldwork, drawing on research that examined urban automated management, wherein software is used to automatically regulate traffic flow in a city. In this case, the study addressed: 1) polyrhythmia at different scales produced by algorithms, technology, management and urban life, and; 2) the process of organizing multiple timelines to tune the ‘heartbeat’ of the city. Time is a resource for coordination and regulation, as well as for making sense of actions and experience. Being increasingly dispersed, and black-boxed in a multiplicity of processes affecting and configuring the way the past, present and future are performed and lived, time also represents a new object of concern for the ethnographic investigation of algorithmic management. I argue that ethnography allows us to understand the material organizing of dispersed and heterogeneous temporalities while also intersecting with such temporalities. Drawing on Guattari and Deleuze’s concept of ‘refrain’ and from Lefebvre’s ‘rhythmanalysis’, I introduce the concepts of *rhythm-making* and *halfway ethnography* with the purpose of accounting for the manufacturing of multiple temporalities and for the time-boundedness that links ethnographic practice and the technological, organizational, and cultural ‘heartbeats’ of fieldwork. This approach intends to temporally and spatially reposition organizational ethnography, offering analytical tools to study new contemporary entanglements of ethnographic practice and data.

Key words: time, rhythm-making, halfway ethnography, automated management, city heartbeat

Introduction

Interviewee: It takes time to understand whether sensors work or not. You need to choose the interval in which you retrieve the data. Because if you retrieve them every second you have plenty of information, but there also can be much noise. If you retrieve them every hour it is more normal but you can lose information, so you need to find a compromise, the right balance.

Interviewer: Also in relation with the times of the city: morning, peak hours, evening...

Interviewee: Exactly. Then the higher the resolution, the higher the consumption of battery; the more you keep data in the flashcard, the more you have to transmit them. There is a whole series of compromises you need to deal with. (Civil engineer, University)

My main interest in this paper is time and temporality in ethnography in relation to the temporality of urban automated management, and the conversation above was the initial spark for my interest.

Automated management refers to “the regulation of people and objects through processes that are automated (technologically enacted), automatic (the technology performs the regulation without prompting or direction), and autonomous (regulation, discipline, and outcomes are enacted without human oversight)” (Kitchin and Dodge, 2011:85). Whereas automated management has been used to understand how the interplay of software and sociospatial practices affects everyday life and governance in cities, this paper pays attention to the temporal dimension of algorithms and urban management processes, as well as to the temporalities enacted by research practice itself. Specifically, I introduce the concept of *rhythm-making* and *halfway ethnography* to account for the time boundedness that links ethnographic practice and the technological, organizational, and cultural ‘heartbeats’ of fieldwork. The concept of ‘heartbeat’ has recurred at various times in our fieldwork, both in the presentations of city-managers and in interviews with practitioners. Our informants stressed the co-existence of many different timelines and tracks within a city, such as the timelines that are data-driven, whose beat are calculated in fractions of a second, and those that are not driven by electronic internet time clocks, whose pulse rate is measured in decades: the heartbeat of the city becomes then the provisional sum of many mutable urban rhythms. They include the short-term and long-term decision making on mobility, environment and urban development. In other cases, the heartbeat of the city is related to the lived experience of people coping with

parking, lighting, public transportation and the possibility to be informed in real-time and ‘at the touch of a button’. Finally, the heartbeat is associated with the way the city is measured and calculated, and with the devices used in these measurements and calculations: the frequency rate of data capture is a crucial aspect in making sensing devices actionable for urban management purposes as it intertwines with working and management practices.

All these aspects point to the complexity and heterogeneity of urban life and to the issue of integrating different temporalities in management processes, especially in an age of desynchronization with “a greatly increased variation of different people’s times” (Urry, 1994:141). The desynchronization of contemporary age might appear less visible in urban automated management, but is certainly not less significant: given the interconnected and multifarious kind of rhythms and measures, management needs to combine different *tempos* in order to be effective. On the one hand, organizing the overlapping, concatenated, multiple rhythms of everyday life allows to generate predictable models which are used to manage systems that mediate urban life; on the other hand, setting up the frequency and the right measures requires continuous adjustments and balances, which depend on the historical and contemporary city life, and are related to mutable mobility and planning aspects. Thus, setting a rhythm requires making an important distinction between what is relevant for management and what is not, what can be predictable and included and what cannot. This approach on city rhythms can offer a novel understanding of how Internet of Things and algorithms affect the present management of cities, and how the rhythms of the people who dwell in those cities are reconfigured (Coletta and Kitchin, 2016).

The problem of synchronizing distant events which happen at the same time has been one of the main concerns of the 19th and the 20th century (more for colonialist purposes than for scientific knowledge) until Einstein’s relativity theory replaced the idea of a central clock with distributed locations, in which every clock is setting the next through automated, repeated, materialized and distributed simultaneity (Galison, 2004). As Galison details, it would have been much more difficult for Einstein to develop the Relativity without living in Bern at the beginning of 20th century, where close to his patent office he could admire the railway station equipped with an advanced series of coordinated clocks. Likewise, we can say that the ethnographic account depends on the relations with where and when the account is produced. While the issue of *where* the ethnography takes place and *where* the action has been largely addressed, the issue of *when* the ethnography takes place and how it is synchronized with the fieldwork seems to have been less explored. As Dalsgaard and Nielsen (2013: 8) point out, what is required is to acknowledge the time dimension of fieldwork “both in relation to concrete

ethnographic work and as an anthropological representation [...] identifying the precise juncture at which new insights are constructed from the relationship between research questions and ethnographic data”. Synchronization affects ethnographic practice, as well, joint to the temporality of organizational and urban settings. In particular, it involves the technicity of this relation and the way the time of research activity is combined and attuned with the observation of automated management as the new object of concern.

I did not start my fieldwork with the idea of rhythms and temporalities. At the beginning, I explored the making of Dublin as a “smart city”, following the Smart Dublin initiative¹: my duty, together with my colleagues, was to map all the smart city related projects undertaken in the city. The research enabled me to undertake several extensive interviews with researchers, entrepreneurs, associations, city managers, who talked about different cases of smart urban services. The rhythm idea simply came to me on a rainy Irish afternoon, when I was interviewing a researcher in engineering, working on sensing devices for air pollution monitoring. In the interview, quite a few exciting “boring things” came out, as Susan Leigh Star (2002) called things hidden in plain sight that once noticed allow us to unravel the entanglements around them. What emerged as a side story of my research activity led me to look back to the past interviews and focus the analysis on temporal aspects; those that bind together technology and management.

This episode made me reflect on a primary issue related to ethnographic practice: how do you decide that the things you are investigating through ethnography are concerns? And to whom? Doing qualitative research on (and in) cities seems especially indicative of the serendipitous character in the exploration of urban phenomena (Sonda et al., 2010). As Van Maanen (2011) has pointed out, “learning in and out of the field is uneven, usually unforeseen and rests more on a logic of discovery and happenstance than a logic of verification and plan”. The city scale of the fieldwork is co-extensive with your everyday life experience, your research practice is entangled with the object of your analysis. Ethnographic practice allows you to move within entanglements and follow mundane traces without having a specific research question, alternating the data collection routine, reflexivity and writing. At a certain point, after collecting a number of notes, conversations, materials, that entanglement

¹ The initiative (www.smartdublin.ie) involves the four Dublin Local Authorities: Dublin City Council, Dun Laoghaire-Rathdown City Council, Fingal City Council, South Dublin City Council. It consists of a mix of data-driven, networked infrastructure to foster economic growth, entrepreneurship and citizen-centric initiatives (Coletta *et al.*, 2017)

overflows: the ethnographic routine requires a new attunement, a new rhythm to cope with fieldwork; that is when ethnography produces a drift from boredom to surprise, which forces you to differently re-articulate the entanglement in a possible, meaningful way.

Rhythm-making and urban automated management

Going back to the opening quote, it surprised me because it accounts for epistemological and ontological issues in a very pragmatical manner: epistemological, because it is the time intervals that decide what is signal and what is noise; ontological, because time frequency has a material dimension and depends on the durability of the battery and the memory of the flashcard. Moreover, both epistemological and ontological aspects appear as contingencies of a practical “compromise”: how to adjust time in order to fit with the ‘heartbeat of the city’?

My research was about the growing use of software in urban management and governance processes. Once granted the access to the roadmap, my research colleagues and I started to follow the development of the Smart Dublin initiative and facilitating workshops. I mapped ongoing initiatives connected with the Smart Dublin strategy, contacted related people, and arranged interviews. Basically, the pattern was quite straightforward: meet the interviewees, get their signed consent, ask questions, listen, record, encrypt, transcribe, repeat. We created a spreadsheet with the cases classified according to respective areas (Smart Mobility, Environment, Living etc.), type of service provided (e.g. tourism, waste management, etc.), technology adopted (e.g. sensor network, web platform, mobile app), scale (e.g. local authority, city region, national etc.), organizations involved, and so on. Through the spreadsheet we also monitored the progress of research, recording contacts, the status of the interview (done/to do), the status of the related information sheet we were supposed to write (done/to do). The spreadsheet acted as a rhythm-making tool, setting up the pace of our work. In turn, the spreadsheet has been reworked and adapted several times as we added and amended categories in tact with the growing number of interviews. Surprise came with repetition and routine: the rhythm of interviews and analysis and the resonance between the two added more questions and categories, which in turn were translated into new rows and columns in our spreadsheet. After a number of weeks of fieldwork, the Principal Investigator asked for a meeting to tune up our categories of analysis: “Let’s bring one transcribed interview each and code them together”. We started at noon with the first bit of transcript:

Well I suppose it's in common with most large cities we have had a traffic control centre for a number of years. So our first traffic control centre was built around 1987 or even 1986 and it has

gone through several different iterations and expansions and so on. The latest version of it was considerably changed in 2013. The traffic management centre itself is a 24 hour, 7 day a week operation, it is staffed by our own control room operators. At peak times it has people from AA Roadwatch which is the motoring organisation here. We have facilities for the police and the public transport service to be here as well, so at the moment during the run up to the Christmas busy time they are in there every day. So we have somebody from the police and somebody from the public transport operators. We also have our own dedicated radio station which broadcasts six hours a day, 7:00 to 10:00 and 4:00 to 7:00. And the idea of that is it provides very detailed traffic information to people in very much a real-time fashion using all the cameras and the technology that we have in the traffic control centre. (Senior executive manager, Local Authority)

Initiation year, peak times, continuous 24/7 time, evolutionary times, cyclic times, real-time, Christmas time, broadcast times ... and it was just the first paragraph. A couple of transcripts, 40 pages and three hours later, we were pretty convinced that time and temporality were important categories to understand smart city development in Dublin. The temporality of texts analysed interacted with the temporality of our research practice: we tuned up our own categories and ‘at the same time’ shaped the rhythm for future analyses and fieldwork. During the following interviews, time and temporality were resonating at the back of my head until coming out to the front that rainy afternoon of February 2016, when I met the engineer who was working on sensing devices for air pollution monitoring: time, indeed. No, wait, more than time: frequency, rhythm, *algorhythms*!

As I addressed the literature, I acknowledged that the idea was not new, but embedded in a multifarious and rich debate. At the same time, the “scientific debate” did not exactly pre-exist the idea, rather it has been actualized in a specific, partial version. Being immersed in literature pushed me to negotiate a position and angle the phenomena so to emplot the literature and the fieldwork into a story, a *polyphonic* one.

From rhythmanalysis and temporal work to rhythm-making in organizing

The first literature connection was made to the Lefebvre's rhythmanalytical project. According to Lefebvre (2004[1992]), rhythms are interactions between a place, a time, and an expenditure of energy. They are brought into existence as interferences of linear and cyclical processes through measure, calculation and repetition to make things familiar, maintained, manageable. Yet “there is no identical absolute repetition, indefinitely. Whence the relation between repetition and difference [...] always something new and unforeseen that introduces itself into the repetitive: difference” (Lefebvre 2004[1992], 6). As Elden (2004: 195) explained,

Lefebvre's interest concerned the "interdynamics" of rhythm which materializes in everyday life, namely "how various rhythms relate to one another (in, say, polyrhythmic, isorhythmic, eurhythmic, or arrhythmic forms)". In this perspective, the lens of rhythm has been useful to scale up the analysis at the urban level and helped to look at the temporal entanglements of algorithms, urban management practices and smart city governance (Coletta and Kitchin, 2016). With the concept of "algorhythmic governance", we proposed an actualized reading of Lefebvre's rhythmanalytical project in line with a recent thread of research which emphasizes the technological and algorithmic aspects of rhythmanalysis in environmental (Palmer and Jones, 2014; Walker, 2014) and financial processes (Borch et al., 2015). As noted by Borch et al. (2015) in their account of high frequency trading in financial markets, "rhythmanalysis provides a rich reservoir of ideas for empirical work" (p. 1082), but "the bodily focus on Lefebvre's project makes it unsuitable for fully grasping the development toward algorithmic trading" (p. 1084). This is where the contribution of Science and Technology Studies, and Actor-Network Theory in particular (Latour, 2005), can help to rethink the bodily aspects in relation to and interfering with other heterogeneous rhythms, such as those of algorithms, management and cities. In fact, algorithms are distributed and operate as part of a larger assemblage (Dourish, 2016). They need to talk to each other (Neyland, 2015), as their calculation affect people, organizational processes and places (Kitchin, 2017), but they are often inaccessible to public scrutiny and enact different grades of inclusion and exclusion (Gillespie, 2014; Neyland, 2015; Pasquale, 2015; Janssen and Kuk, 2016).

Chasing time in the literature of organization theory I traversed various studies that since the late 1980s have addressed the temporal aspects of organizations and institutional settings. Gherardi and Strati (1988) accounted for the specificity of organizational time made of multiple temporal ordering (evolutionary, mythical, historical, metahistorical, looking-forward/backward): in their view, organizational time cannot be defined *a priori* and is embedded in the activities of organizational actors, such as strategic thinking and decision making, providing the instruments for organizational change. Similarly, Dubinskas and contributors (Dubinskas, 1988) locate the understanding of organizational times as made of social action and "embodied in different media like speech and writing, narrative accounts, and argumentative interchanges" (p. 24), across singular events: "Time, culture and the ongoing processes of organizational life in which they are embedded are inseparable" (p. 19).

The idea of time as both shaping and shaped leads towards a qualitative understanding of temporal phenomena, especially through an ethnographic method which is able to grasp the microphysics and the performativity of temporal work and lived experience in organizing.

Since the last decade, organization theory scholars have emphasized the greater relevance of kairoic as compared to chronological time (Whipp et al., 2002; Czarniawska, 2004; Rämö, 2004). Roe (2009) proposed a pragmatist approach to measured time and experienced time in organizational research, which would help to overcome the opposition between positivist and interpretive perspectives. Studies of the temporal dimension of management explored time in the social practices of organizational and institutional actors. Ancona and Chong (1996) introduced the notion of *entrainment* as “the adjustment of the pace or cycle of one activity to match or synchronize with that of another” (p. 251). Orlikowski and Yates (2002) proposed the concept of *temporal structuring* to describe the multiple temporalities enacted by people in everyday practices, who coordinate distributed activities bridging linear and cyclic, objective and subjective time, Kairos and Chronos. More recently, Granqvist and Gustafsson (2016) introduced the concept of *temporal institutional work* to describe how “actors formulate new temporally constructed understandings” (p. 1010). Reinecke and Ansari (2015) showed how organizations at the intersection of temporally incongruent worlds engage in “temporal brokerage” to negotiate conflicts between the timelines of different corporate actors engaged in market and development: these actors leverage on *ambitemporality*, namely they mediate temporal conflicts switching from and to different temporal constructs, such as clock-time and process time. These contributions provide rich empirical accounts of temporal work with the goal of synchronization and coordination of activities. Here rhythms and cycles result from the interaction of (multiple) temporal structures on the one hand, and structuring practices that adjust and maintain them on the other. Drawing on Giddens structuration theory (1984), and applying the structure-agency dialectic, Granqvist and Gustafsson (2016: 1013) observed both that timing norms shape action and that they become “enacted and constructed in specific situations”, and this may have implications for institutional change.

However, the double concepts of temporal work and temporal structures as constitutive element of rhythms and time norms do not cover the open and undetermined forms of time-making in organizing processes. Especially in cases of automated management, where there does not seem to be any *Zeitgeber* (Ancona & Chong, 1996; Bluedorn, 2002; Ballard, 2006); there are rhythms without pacesetter as well as there is “organizing without knowledge” (Luhmann, 1998: 98 cit. in Czarniawska, 2009). Likewise, the separation between the measurable, objective, linear time and the experienced, subjective, non-linear time could be misleading, even if one acknowledges the socially constructed character of measures and chronometric devices. The way calculation is distributed and embedded in technical devices makes a qualitative difference, since those devices acts autonomously and generate new

relations: the challenge is to understand how the experience and measure of time actually interact with (and are affected by) the measured temporalities, and how time is materialized, configured and calibrated according to specific devices, knowledges and practices. The contributions addressing these issues usually come from bridging Management & Organization Studies and STS, stressing the temporal dimension of algorithms, as “a continuous string or stream of interpenetrating—prior and subsequent—actions” which inherit and impart orders (Introna, 2016). On the other hand, algorithms are also “algorhythms”, namely a computational model of “a machine that makes time itself logically controllable and, while operating, produces measurable time effects and rhythms” (Miyazaki, 2013). Finally, as suggested by Weltevrede and colleagues (2014), the “real-time” effect fabricated by media devices and algorithms “does not unfold as a flat, eternal now or as a global, high paced stream” (p. 140): rather, the “*realtimeness* undolds as a specific temporal condition” (p. 143) composed by “different patterns of pace” (p. 138) with specific technicity and socio-technical arrangements.

Taking rhythms as constitutive of temporalities in (urban) management is to shift the focus on translation processes from the sequential ones to the *repetition and synchronization of sequences* in different settings. More specifically, I am introducing the notion of *rhythm-making* in the endeavour to combine Lefebvre’s rhythmanalytical project with Deleuze and Guattari’s (1987) definition of rhythm as a “productive repetition” made out from chaos. Repetition here is not considered in terms of mere reproduction of timing norms as institutionalized temporal routines: according to Deleuze and Guattari, repetition creates difference, thus generating territorial *refrains* with peculiar regimes of action. The two authors, probably in one of the most obscure section of their book, reflect on the relation between chaos, rhythm and milieu: milieus consist of specific and unstable arrangements made of rhythmic, repeated vibrations, such as the song of the bird which marks its territory or the humming of people in unknown places which produces a feeling of familiarity.

In terms of organizational processes, we can consider the refrains as the practices, narratives, technical pulses whose vibrations and interferences produce the space-time arrangement of milieus. The focus is not in discrete actors, humans or non-humans, but in the waves of action and interferences that are created. Such waves of organizational action are not ordered in regular beats, in line with Deleuze and Guattari’s argument that “productive repetition has nothing to do with reproductive meter” (1987: 314).

Speaking of rhythm-making in organizational processes I refer to a spatio-temporal work without either structures or time givers, where “[t]ime is not an a priori form; rather, the refrain is the a priori form of time, which in each case fabricates different times” (Deleuze and

Guattari, 1987: 349). In this sense, “time structures” can be considered as a territorial refrain whose productive repetitions make them more or less stable organizational arrangements (milieus) and where rhythms act as “transcoded passage from one milieu to another” (p. 313). In this way, rhythms can be used to account for the co-existence and overlapping of different activities in the same place, and explore how the superposition of polyphonic flows of action – including ethnographic ones – are turned into repeated beats, and *vice versa* how these beats perform differences and require new attunements to bring them into order.

When considering ethnography as entangled in the beats of the fieldworks, rhythmanalysis and rhythm-making become both sides of the same coin. In the well-known article “On Time, Space, and Action Nets” Barbara Czarniawska’s (2004) engages with the ability of ethnography in dealing with different centres of calculation in different spaces at the same time: how long time should we spend on fieldwork to account for what actually happened? How should we look at organizations? Should we focus on places, people, issues, events? Being contemporary organizations featured by dispersed calculation, she points out that investigation methods need to be reconsidered in terms of mobile ethnologies. Both fieldwork and the focus of research are part of the same problem, they cannot be taken separately if we want to trace the complexity of action-nets. Taking the cue from Czarniawska, I am focusing on the mobility through multiple times rather than spaces: in this case, I argue, *dispersed temporalities* require *rhythm-making* as method, technique and focus of analysis for shadowing and emplotting time. Bridging organization studies and STS, my proposal is to use rhythm-making to connect the time-boundedness of computational cultures, the time-boundedness of management cultures, and the time-boundedness of ethnography: how heterogeneous temporalities scale up and down; how they resonate into management and working practices; and how we can understand those. In other words, how is an apparently tiny phenomenon such as the time frequency of a sensing device connected to apparently large phenomenon, such as urban management and organizational change, and which is the methodological practice allowing such connection? It is to this I now turn.

Halfway ethnographies in the Traffic Control Room

The Dublin City Council Traffic and Incident Management Centre hosts dispersed temporalities shaped by multiple rhythms. At the centre of this activity is the adaptive traffic management system, SCATS (Sydney Coordinated Adaptive Traffic System). SCATS is a software infrastructure that manages in real-time the traffic lights at junctions based on inductive loops installed on the street which count and detect vehicle presence in each lane and

the time intervals between them, as well as demand for pedestrian crossings. The system interacts with operators in the traffic control room who can adapt and adjust SCATS timing based on CCTV monitoring – whose data are not stored – and feedback by drivers. Every 20 seconds, a GPS feed coming from the 1000 or so buses circulating in Dublin is integrated with the data coming from the inductive loops. As you enter the control room you can likely hear radio music coming from the speakers on the walls, and realize that a radio station is *inside* the room: three smaller desks located in the back-left corner hosts Dublin City FM’s live broadcast of traffic news and music between 7-10am and 4-7pm, Monday to Friday. At the end of each song, the presenter goes on air updating drivers on the traffic situation, supported by an assistant and a producer. Meanwhile, operators continue to type on their CCTV controller, switching from camera to camera and monitoring the flow, also providing the percussions tapestry to the music and the talking inside the room.

I would call it a rhythmically – as well as technologically (Bruni et al., 2014) – dense environment, where rhythms engage different human and non-human “players”, and slow down and accelerate according to the events:

It’s the end of the interview with A., the supervisor of the traffic control room. I am asking the last questions when the tail of his eye capture something on the CCTV screen that I (being in front of it) did not even notice: a Dublin LUAS tram is stuck in the middle of a busy junction blocking traffic on both ways. He addresses the operator on the other side of the room “D.? Camera number ***” D. types the number on the CCTV controller, evaluating the possibility to override the SCATS in order to ease the flow blocked around the junction. Few seconds later the radio presenter starts to give the situation on traffic, but he is into another rhythm: he knows that there is something going on, but did not take the last event in the list of updates and skips the info. They call the LUAS control centre to receive (and give) updates. Everything lasts a very long five minutes, then the tram moves and frees the street. (Ethnographic note, 11th November 2016)

The CCTV captures the rhythm of the interview, a silence interval in a blink of an eye produces a difference through which the milieu of the interview is transduced into the milieu of traffic management. The beats of traffic management start to pulse differently, from the supervisor to the operator on the other side of the room, as a sort of duet, then to the SCATS system to change the phases. These abrupt changes of pace seem to constitute the routine of work inside the room and in turn they interfere with the coffee breaks and lunch breaks, and with the temporal organization of the work of radio operators (two shifts of 3 hours per day excluded weekends) and the work of traffic operators, 24/7 divided into shifts of six hours. The

latter generates a further element of interference: the extended presence of operators through the whole day makes them able to provide assistance phone calls on water infrastructure faults and interruptions, providing information and redirecting the call in case of emergencies and repurposing the traffic centre management to a sort of call centre for plumbing issues. Finally, regular meetings of senior managers take place every two weeks to see if the configuration of the system continues to be effective or not and a situation room is available for major events, with desks reserved for police and other authorities during special events or emergencies. It was just to observe what happens during one of these special events that I visited the traffic control room one Saturday afternoon in July.

A very quiet Saturday afternoon, despite the fact that Beyoncé is performing a big concert in the evening. One operator in the silent room, with the radio station not airing during the weekend. It's a very different atmosphere with respect to the weekdays. The telephone rings, a taxi driver is stuck in the traffic and requires remote assistance to ease the flow. He reports that work-in-progress barriers have been removed in Stephen's Green [one of the busiest junctions in Dublin, where in addition there are construction works for the new LUAS line]. This is probably due to some pedestrians that moved the barriers to create a shortcut for crossing the road, J. Says. She checks in one of the displays a document with the updated shifts and contacts of workers in the street and makes a call. There is no answer, she takes a memo in a notebook to call later. She says with a smile that she recognised the taxi driver at the phone: "He's not new to call, he was talking hands-off with the speakers on because he wants to bully with the passenger that he can have the way cleared from the traffic management centre". (Ethnographic note, 9th of July 2016)

In the surreal atmosphere of a Saturday afternoon J.'s observation teleports me into the taxi, so that I am sitting close to the passenger. I can watch myself in the traffic jam monitored in the camera controlled by J. in the control room, where she indicated to me the taxi. I am there, taking notes about the bold attitude of the taxi driver. And I am here, listening to the operator's account. Also, J. is a traffic operator and then switches to another milieu of action calling the workers on the street. This kind of ethnographic feeling leads me to rethink the multi-site ethnographic approach (Hine, 2000; Marcus, 1998) as something that I would call *halfway ethnography*: rather than moving from site to site, rather than dealing with different publics and audiences, the magics of ethnography is that you inhabit (and attune with) indeterminate space-time settings. The term *halfway ethnography* echoes the work of Karen Barad (2007) on quantum physics and agential realism. It rejects, as Barad does, "[the] attempt to find some "middle ground" between social constructivism and scientific realism", and it addresses the

indeterminacy of a very specific and situated practice, the ethnographical one, as entangled with other working practices.

Consider also this *vignette* from Boersma (2013) referring to his account of an “Unofficial St. Patrick Day” local event, monitored from a police surveillance room:

Late at night we had dinner in the operations centre. The social media footage, the projected images of CCTV, and local television news reports fused into a long, cluttered image that we eventually experienced as cinema-like. It was as if we—present in the operations centre—were watching a movie: eating pizza, drinking soda and staring at fragments of camera images from an event far away without a clear plot, but fascinating enough to hold our attention because we were, in one way or another, involved in the action, like the prison guard at the Panopticon. Halfway through the evening, a student, clearly in a state of drunkenness, yelled at the camera of the local television station: “And the police gave us a lot of trouble today!” causing general laughter in the operating room. (Boersma, 2013: 115-116)

It suggests a similar halfway mechanism where the watchers are part of what is being watched, although the situation of the police control room seems less estraniating than in the traffic control room: the activity of surveillance, in fact, prescribes a sharp distance between the law enforcement and potential infringements which generates sarcastic laughter. Instead, the traffic control room in Dublin acts much closer to drivers, buses and cars, since operators depend on traffic users for crowdsourced reports on traffic conditions and vice versa drivers need up to date information on accidents and congestions.

With respect to the classic accounts on control rooms (Heath and Luff, 1992; Suchman, 1987), the Dublin traffic control centre could appear much more silent: most of the communications have been delegated to automated management and the core staff is composed by 5 people (4 operators and the supervisor) which alternate along the day and night shifts, the radio being operating only 6 hours during weekdays. You may hear fewer ‘self talk’ (Heath and Luff, 1992: 80) that turn out to be public and short conversations or jokes inside the room (face to face, by phone or by social media) while operators work. The informal spaces devoted to breaks – such as the legendary “coffee machine” (which in this case is the kitchen) – are lived in a lonely way for quick lunch breaks. At the same time, in another sense it is much louder: everybody talks (at the phone, at the radio), but not to each other.

The Traffic Control Room is the liminal place of informal and formal conversations, on-air transmissions and phone calls, automation and human management. Radio staff act as traffic controllers and vice versa, they inform each other on the respective activities:

What is good about the radio station is that is a live commentary. They get so much information using tweets, or people texting them. You can help a colleague to say what's happening, but the radio station is actually telling you what's like as well. It's really helping to do your job. (Traffic controller #1)

As soon as he tells me, the operator goes to the software that manages billboards on the street, and insert the ad with the radio and the respective frequency:

It's good way. It's free publicity. We want people [drivers] to listen to radio as much as possible. (Traffic controller #1)

The CCTV on the operator screen is now showing the sign "103.2 DUBLIN CITY FM RADIO". The situation is again estraniating, halfway: I am in the room, listening the radio and having an interview. The radio starts to give information to drivers, the operator tells me about the importance of the radio and immediately after activates the electronic billboard somewhere in Dublin, showing it to me with the camera management software. Where am I? When am I? Where and when are the operators when doing their work?

Halfway ethnography is a way to practice rhythm-making by emphasizing the research in between beats. The condition of liminality between being inside the control room and inside the taxi is one example, as well as the condition of boredom and reflexivity that at some stage produces surprise. Indeed, being halfway is not a privilege of the ethnographer, since as illustrated above traffic management is just one of the activities carried out by the staff, and different monitoring technologies, expertise and milieu are transduced into each other. Such forms of ethnographic rhythm-making in between the beats reflects and interacts with the silences and breaks within phenomena that change the pace of the situation, such as in the case of the LUAS or in the case of switching from the task of traffic operator to the one of support on infrastructure failure, from cameras to SCATS monitor, from certain cycles and phases to overriding them for easing the traffic. The organizing routines interfere with technical rhythms, which in turn interfere with the rhythms of fieldwork. Rhythms are more or less automated with different time ranges, either related to everyday management or to special events, either planned or unplanned. They involve theoretical, methodological and empirical aspects as well as GPS transponders, induction loops, visualizations, working practices, radio stations, large digital and material infrastructures, the whole city.

Heartbeats of cities, heartbeats of ethnography

The Traffic control room is an extended space made of different publics acting at different paces: its temporal flows overlaps and change the heartbeat of the city itself (Coletta and Kitchin, 2016), which has an institutional, infrastructural and historical “pulse rate” measured in days, decades and centuries, not easily synchronized with the real-time one of smart urbanism (not to talk about the pulse rate of the Earth, which is calculated in terms of ages). The polyrhythmia of real-time cities, the superposition of human and non-human rhythms, seems to create a collective ‘algorhythmic trance’ without any centre of calculation or *Zeitgeber*. Automation produces a sort of obliteration of time and knowledge: work happens “live”: the real-time videos from the 380 cameras all over the city are not stored, SCATS collects the data from counting the cars and automatically generates statistics to adjust timing without human oversight. Rather than temporal feed-back from specific pacesetter, we have a rhythmic “feed-around” from multiple beats, which may also contribute to phenomena of *accidental urbanism* (Coletta *et al.*, 2017).

Knowledge dissolves in repetition and time is manufactured, embedded in technical devices: whereas scholars remarked that time dimension in organizational settings has been largely neglected, even less attention has been paid to the materialized aspects of temporality. In addition, whereas temporality has been largely explored as lived time in urban everyday life, scant attention has been paid to the configuring and calibrating time for others, and to the heartbeat of temporal assemblages. The present contribution on rhythm-making in urban automated management addresses such shortcomings. In smart city development, synchronization and calculations are dispersed and connected: we observed different rhythms acting at different scales, the scale of sensor networks, the scale of software infrastructure, the scale of management, all composing the heartbeat of the smart city. Temporality here is manufactured by rhythm-making performed by technical devices, as well as scientific knowledge and working practices, all intertwined. Whereas the problem of temporality in management processes has been addressed by the scientific literature, either through the dualisms of agency/structure or subjective/objective time, this paper shows that rhythm-making is based on diffractive repetition which creates transductions from one milieu to another creating the effect of acceleration and slowing down, such as in the case of traffic control room where the rhythms of peak hours are replaced by rhythm of management of sudden disruption or accidents. But there are also other kinds of rhythms, such as the ones of sensing devices whose changing frequency determines the knowledge produced. Pragmatically, the kind of knowledge we have of environmental phenomena depends on the

way sensors are configured, which in turn depends on the data baseline chosen as ontology for the configuration. In this case, diffractive repetition is related to the specific time frequency that becomes specific knowledge that produces specific policies.

I believe that embracing a rhythm-making and halfway perspective offers various advantages in the study of organizing temporality and change. First, it allows us to take into account the agency of non-human entities in the construction of temporality, as connected with other entities which play a prominent role in in the case of automated management of urban services. Secondly, bypassing the dualist approach agency-structure allows to focus on the “making without structure” of temporality in a relational perspective. The same goes with the dualism of tense, subjective time (flowing, kairotic) and tenseless, objective time (discrete, chronologic): they are the product of rhythm-making, as well as the evolutionary, episodic, cyclic and emergent characters of organizational change (Dawson, 2014) and becomes a way to cut the interference of different (algo)rhythm-making.

Finally, rhythm-making allowed ethnographic and research time be approached as both as concern and a way to frame how things happen, looking at how ethnography participates in and copes with the construction of multiple rhythms and temporalities. It involves the issue of how long ethnography needs to last. Probably anthropologists would repulse any ethnography lasting less than one year, but especially in organizational settings the problem is how the time of the self interacts with the time of others. “From the window” – Lefebvre says (1996: 220) – “noises are distinguishable, fluxes separate themselves, rhythms answer each other”. Yet ethnography is not behind a window anymore and probably never been, especially in organizational settings:

Now, time in contemporary, complex organizations is condensed, and it is counted at many places concurrently. It is not only coeval, but also multiple. And it runs fast. The journalists I studied could not understand why I needed so much time to write my report. They believed as well that it would become obsolete in a year (Czarniawska, 2012: 133).

“As our world at reach has widened” – Czarniawska continues – “there is a problem in trying to record and interpret it. Zapping is one solution; a bird's-eye view another; but they hardly solve the difficulty of contemporary fieldwork: how to study the same object in different places at the same time?” In the case of halfway ethnography, an additional problem is how to study the different temporalities in the same place, or even different temporalities in different places. Rhythm-making in ethnographic practice represent one possible answer to the issue of both

how long the fieldwork should be and how to deal with dispersed time-space and calculation. Rather the number of years and months spent in the fieldwork, what counts is the way ethnographic practice gets in tune with the fieldwork and produces accountable rhythm-makings.

Acknowledgements

The research for this paper was funded by an ERC Advanced Investigator award (ERC-2012-AdG 323636-SOFTCITY). The author is grateful to thank Barbara Czarniawska, Aoife Delaney, Liam Heaphy, Rob Kitchin, Caspar Menkman and Sung-Yueh Perng for useful discussion, comments and feedback.

References

- Ancona D and Chong C-L (1996) Entrainment: Pace, cycle, and rhythm in organizational behavior. Available from: <http://doi.apa.org/?uid=1996-98665-006> (accessed 15 February 2017).
- Barad K (2007) *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Durham: Duke University Press.
- Boersma K (2013) Liminal Surveillance: An Ethnographic Control Room Study During a Local Event. *Surveillance & Society* 11(1/2): 106.
- Borch C, Hansen KB and Lange A-C (2015) Markets, bodies, and rhythms: A rhythm analysis of financial markets from open-outcry trading to high-frequency trading. *Environment and Planning D: Society and Space* 33(6): 1080–1097.
- Bruni A, Pinch T and Schubert C (2014) Technologically dense environments: What for? What next? *TECNOSCIENZA: Italian Journal of Science & Technology Studies* 4(2): 51–72.
- Coletta C, Heaphy L and Kitchin R (2017) From the accidental to articulated smart city: The creation and work of ‘Smart Dublin’. Programmable City Working Paper 29 <https://osf.io/preprints/socarxiv/93ga5>
- Coletta C and Kitchin R (2016) Algorhythmic governance: Regulating the ‘heartbeat’ of a city using the Internet of Things. Programmable City Working Paper 22, in press *Big Data and Society*. Available from: https://www.academia.edu/29906189/Algorhythmic_governance_Regulating_the_heartbeat_of_a_city_using_the_Internet_of_Things (accessed 17 November 2016).
- Czarniawska B (2004) On time, space, and action nets. *Organization* 11(6): 773.

- Czarniawska B (2012) Organization theory meets anthropology: A story of an encounter. *Journal of Business Anthropology* 1(1): pp–118.
- Dalsgaard S and Nielsen M (2013) Time and the Field. *Social Analysis* 57: 1-19.
- Dawson P (2014) Reflections: On Time, Temporality and Change in Organizations. *Journal of Change Management* 14(3): 285–308.
- Deleuze G and Guattari F (1987) *A thousand plateaus: capitalism and schizophrenia*. Minneapolis: University of Minnesota Press.
- Dourish P (2016) Algorithms and their others: Algorithmic culture in context. *Big Data & Society* 3(2). Available from: <http://bds.sagepub.com/lookup/doi/10.1177/2053951716665128> (accessed 27 August 2016).
- Dubinskas FA (ed.) (1988) *Making time: ethnographies of high-technology organizations*. Philadelphia: Temple Univ. Press.
- Galison P (2004) *Einstein's Clocks, Poincare's Maps: Empires of Time*. New York: W. W. Norton.
- Gherardi S and Strati A (1988) The temporal dimension in organizational studies. *Organization studies* 9(2): 149–164.
- Giddens A (1984) *The Constitution Of Society*. University of California Press.
- Gillespie T (2014) The Relevance of Algorithms. In: Gillespie T, Boczkowski P, and Foot K (eds), *Media technologies: Essays on communication, materiality, and society*, Cambridge, MA: MIT Press, pp. 167–194.
- Granqvist N and Gustafsson R (2016) Temporal Institutional Work. *Academy of Management Journal* 59(3): 1009–1035.
- Heath C and Luff P (1992) Collaboration and controlCrisis management and multimedia technology in London Underground Line Control Rooms. *Computer Supported Cooperative Work (CSCW)* 1(1–2): 69–94.
- Hine C (2000) *Virtual ethnography*. London; Thousand Oaks: Sage.
- Introna LD (2016) Algorithms, Governance, and Governmentality On Governing Academic Writing. *Science, Technology & Human Values* 41(1): 17–49.
- Janssen M and Kuk G (2016) The challenges and limits of big data algorithms in technocratic governance. *Government Information Quarterly* 33(3): 371–377.
- Kitchin R (2017) Thinking critically about and researching algorithms. *Information, Communication & Society* 20(1). Available from:

- <http://www.tandfonline.com/doi/full/10.1080/1369118X.2016.1154087> (accessed 26 March 2016).
- Kitchin, R. and Dodge, M. (2011) *CODE / SPACE*. Cambridge: MIT Press.
- Latour B (2005) *Reassembling the social: an introduction to actor-network-theory*. Oxford, NY: Oxford University Press.
- Lefebvre H (1996) *Writings on cities*. Kofman E and Lebas E (eds), Oxford: Blackwell.
- Lefebvre H (2004) *Rhythmanalysis: Space, time and everyday life*. A&C Black.
- Marcus GE (1998) *Ethnography through thick and thin*. Princeton, N.J.: Princeton University Press.
- Miyazaki S (2013) AlgoRHYTHMS Everywhere: A Heuristic Approach to Everyday Technologies. In: Hoogstad JH and Stougaard B (eds), *Off Beat: Pluralizing Rhythm (Thamyris/Intersecting: Place, Sex and Race)*, Amsterdam: Rodopi, pp. 135–148.
- Neyland D (2015) On Organizing Algorithms. *Theory, Culture & Society* 32(1): 119–132.
- Palmer MP (née and Jones O (2014) On Breathing and Geography: Explorations of Data Sonifications of Timespace Processes with Illustrating Examples from a Tidally Dynamic Landscape (Severn Estuary, UK). *Environment and Planning A* 46(1): 222–240.
- Pasquale F (2015) *The Black Box Society: The Secret Algorithms That Control Money and Information*. 1 edition. Cambridge: Harvard University Press.
- Rämö H (2004) Spatio-temporal notions and organized environmental issues: An axiology of action. *Organization* 11(6): 849–872.
- Roe RA, Waller MJ and Clegg S (eds) (2009) *Time in organizational research*. Routledge studies in management, organisations and society, London ; New York: Routledge.
- Sonda G, Coletta C and Gabbi F (eds) (2010) *Urban Plots, Organizing Cities*. Farnham: Ashgate.
- Star SL (2002) Infrastructure and Ethnographic Practice: Working on the Fringes. *Scandinavian Journal of Information Systems* 14(2): 107–122.
- Suchman L (1987) *Plans and situated actions*. Cambridge University Press.
- Urry J (1994) Time, Leisure and Social Identity. *Time & Society* 3(2): 131–149.
- Van Maanen J (2011) Ethnography as Work: Some Rules of Engagement: Ethnography as Work. *Journal of Management Studies* 48(1): 218–234.
- Walker G (2014) The dynamics of energy demand: Change, rhythm and synchronicity. *Energy Research & Social Science* 1: 49–55.

Weltevrede E, Helmond A and Gerlitz C (2014) The Politics of Real-time: A Device Perspective on Social Media Platforms and Search Engines. *Theory, Culture & Society* 31(6): 125–150.

Whipp R, Adam B and Sabelis I (eds) (2002) *Making time: time and management in modern organizations*. Oxford; New York: Oxford University Press.