Big Data and the Digitalizing Society in China

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BIG DATA AND THE DIGITALIZING SOCIETY IN CHINA

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Abstract

This thesis investigates the development of big data and the smart city, and the relationship between humans, digital technologies, and cities in the context of China. Contributing to the emerging interest of human geography in how big data and other digital technologies reshape the urban space and everyday life, the thesis presents a distinct data story about a digitalizing society of China. In a big data era, accompanying the ubiquity of digital devices and technologies is the lack of consciousness of their socio-political consequences, which nonetheless constitute an important productive aspect of society. Engaging with the discussions in human geography and beyond about the relationships between digital technologies and Deleuzian 'societies of control', Maurizio Lazzarato's work on the production of subjectivity and Gilles Deleuze and Félix Guattari's conception of the machine and the organism, I argue for further understandings of the coexistence of control and discipline as distinct yet dependent modes of social control. I place specific emphasis upon the coexisting processes of dividualisation and individualisation in the operation of big data and other digital technologies. The thesis further illustrates this through the empirical analysis of the development of two smart urbanism projects, the City Brain and the Health Code, and of short video platforms in China, which for me represent two different aspects of everyday life influenced by big data that concern two different political relations, that is, biopolitics, as understood by Michel Foucault, and noopolitics (i.e., politics of the mind) as understood by Lazzarato. In order to de-fetishize big data, the thesis proceeds to discuss its technicity by characterising big data as mnemotechnics, a real-time technology, and a cosmotechnology respectively through the work of philosophers Bernard Stiegler and Yuk Hui. This intervention is also a proposal to rethink and reinvent the relations between humans and digital technology. Turning to Foucault's 'aesthetic of existence', the thesis discusses the possibility of alternative ways of life in a big data era and drawing on Deleuze and Guattari's work, proposes 'becoming a digital nomad' as a methodology to live with digital technologies, explore new possibilities and events, embrace unplanned encounters, and make new, temporary connections in the big data era.

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Chapter I. Introduction

Section 1.1 Big Data and Smart Urbanism in China

This is an era of big data in which various kinds of digital traces of human beings and objects are being produced, collected, stored, processed, and analysed, such as geotagged social media interactions, web browsing histories, online shopping records, health reports, government records, and so on (Kitchin, 2013). With a large population and economy, China is becoming one of the largest production, trading, and application sites of big data in the world. In their report *The Digitization of the World*, the International Data Corporation (2018) estimates that in 2018 China accounts for about 23% of global data generation which is about 32ZB (1ZB = 1000 trillion GB), the United States 21%, EMEA (Europe, Middle East, and Africa) 30%, APJxC (Japan and Asia-Pacific) 18% and the rest of world 8%.[1] Moreover, according to the *Big Data White Paper 2018* (China Academy of Information and Communications 2018),[2] the scale of China's big data industry is estimated to be 40 billion RMBs and that of digital economy 2.72 trillion RMBs in 2017. Indeed, data has become a kind of wealth. In the *Opinions on Building a More Developed System and Mechanism for Market-based Allocation of Factors* published in 2020, the Chinese government has listed data as one of the major factors of production, along with land, labour, capital, and technology.[3] As such China provides a good environment and a great deal of empirical evidence for studying the development of big data and its social and political consequences.

This thesis does not intend to provide a meta-analysis of various large-scale data sets in and of China. Rather, contributing to the emerging interest of human geography and other social sciences in the relations between the humans, digital technologies and cities (see Coletta and Kitchin, 2017, Datta and Odendaal, 2019, Evans and Kitchin, 2018, Gabrys, 2014, Iveson and Maalsen, 2019, Kitchin, 2014b, Kitchin, 2021, Kitchin and Dodge, 2014, Krivý, 2018, Shelton et al., 2015, Vanolo, 2014), the thesis, through presenting a distinct story about the development of big data and smart city in China, examines the ubiquity of big data as a digital technology and how it reshapes the urban space and everyday life in this digitalising society. I think the most striking characteristics of this society is a peculiar symphony

[1] International Data Corporation 2018, *The digitization of the world: from edge to core*, accessed 25 October 2022, <https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf >.
[2] China Academy of Information and Communications 2018, *Big Data White Paper 2018*, Beijing.
[3] The Central Committee of the Communist Party of China and the State Council of the People's Republic of China 2020, *Opinions on Building a More Developed System and Mechanism for Market-based Allocation of Factors*, 9 April, accessed 16 August 2022, in Chinese, <http://www.gov.cn/zhengce/2020-04/09/content_5500622.htm>.

composed of the ubiquity of digital devices and technologies in urban environment which enact ubiquitous, continuous production of data, the ways of life they create, and people's easy acceptance of and accustoming to them, as well as little reflection on how they condition everyday life. Although many previous studies have emphasized the ubiquity and embeddedness of digital devices and technologies (see, for example, Gabrys, 2014, Iveson and Maalsen, 2019, Kitchin, 2014b, Kitchin and Dodge, 2011), I think it is especially evident in a digitalizing society of China. This ubiquity and embeddedness is not hidden in unnoticed sensors and cameras such as used in urban management but reflected in the digital devices, especially smart phones and other so-called 'intimate technologies' (Kitchin, 2021, p. 131), and ways of life that people engage with every day so that a life without digital technologies is unimaginable, whether in urban or rural areas. It could be illustrated by the visibility of the devices for facial recognition payment even in many small, private stores or restaurants.

Accompanied with the development of big data and other digital technologies, I argue, there is also the emergence of what might be termed a new kind of 'technological unconsciousness'. Here, by 'technological unconsciousness', I am not referring to what Patricia Clough (2000) understands as 'the technical substrates of unconscious memory' or the 'technological unconscious' (see also Keating, 2022, Thrift, 2004). Rather, I am referring to the lack of awareness of digital technologies, in particular the ubiquitous, continuous production of data enacted by them, and their limits and dangers (Hui, 2016b). This does not mean that people are completely unconscious of the problems that the data about and of them are produced, collected, analysed and traded, and that data and algorithms, to a greater or lesser degree, influence and mediate their daily lives. But I note that there is a general attitude of indifference towards digital technologies (including sensors and cameras) which conditions people's everyday engagement with them. This indifference is related to the ubiquity, embeddedness and ordinariness of digital technologies, which are too common to get more attention and reflection as they have become an important part for every aspect of people's lives. I argue that the geographical significance of the digitalizing society of China, for the discussion of the relations between the humans, digital technologies and cities, does not lie in the rise of big data and smart urbanism which happens in many other places across the world, but in the general indifference towards the endless emerging of new digital technologies and the ubiquitous, continuous production of data.

Through the symphony of the ubiquity of digital technologies and the indifference towards them in a digitalizing society of China, this thesis takes up a perspective of 'the banality of power' (Datta and Odendaal, 2019) to examine how big data, smart city, and other digital technologies produce and enact power in the banality and routineness of life, that is, in people's everyday engagement with them. More specifically, I focus on how people's everyday activities produce and in turn conditioned by data. For me, digital technologies does not only produce a kind of digital subjectivity, that is a kind of digital citizenship (see, for example, Calzada, 2022, Hintz et al., 2017, Isin and Ruppert, 2020) or smart citizenship (Cardullo and Kitchin, 2018a, Cardullo and Kitchin, 2018b, Shelton and Lodato, 2019,

Zandbergen and Uitermark, 2020), but more importantly, effect a new, digital way for 'the production of subjectivity', a concept I take from Maurizio Lazzarato (2014), an Italian sociologist and philosopher, which I argue is critical to how power is effected through and by digital technologies. I further argue that the ubiquitous, continuous production of data enacted by digital technologies is also a process of ubiquitous, continuous production of subjectivity. I understand the digitalizing society of China as a society in which people live in and between different socio-technical machines which operate through the dual process of the production of data and subjectivity. In this sense, this society represents what French philosopher Gilles Deleuze calls a 'society of control' (Deleuze, 2017), in which power is enacted through the constant modulation of behaviour and action, whether explicitly or implicitly.

On the other hand, apart from the conditioning of everyday life by big data and other digital technologies, I also find, especially during the Covid-19, in a digitalizing society of China, the possibility for different ways to live with them, in which rather than modulating people's behaviour, they enable new connections to be made between people and new ways of being-with-each-other to be created. As Datta and Odendaal (2019) put it, the banality of power, such as reflected in the routineness of everyday engagement with digital technologies, is often interspersed with 'sporadic and concentrated acts of soft power and brute force' (p. 388). I think the outbreak of the pandemic is one of the moments when such 'acts of soft power and brute force' break out, as various digital technologies have been quickly developed and employed to control the spread, whether in China or many other countries (see Kitchin, 2021, p. 207-17). However, it is also during this period that there emerge many creative ways in which people use digital technologies to make connections with each other and get through together the pandemic and all kinds of restrictions and difficulties. This is the reason why the thesis pays a lot of attention to the development and use of digital technologies during the Covid-19. In addition to the well-known story of the rise of big data and smart city in China, the thesis also wants to present a different aspect of this story to show how a different relationship with digital technologies is possible and offer a new understanding about the micropolitics of digital technologies within this society. It is out of and through this different story that I attempt to establish and maintain 'an affirmative ethico-political ethos' (Falcon, 2022), attuned to the life and the living in a big data era (pace Lazzarato, 2006).

In what follows of this section, I want to go to the details of a digitalizing society of China. In *The Thirteenth Five-Year Plan for the National Economic and Social Development (2016-2020)*,[4] To promote the healthy development of the big data industry and accelerate the disclosure and sharing of government data, the Chinese government decided to implement a national big data strategy. On December 8, 2017, President Xi further put forward an objective of 'implementing the national big data

[4] National People's Congress Standing Committee of China 2016, *The 13th Five-Year Plan for the National Economic and Social Development of the People's Republic of China* (2016-2020), Beijing.

strategy to accelerate the construction of digital China'.[5] It is also worth noting that by the end of 2019 most provinces (including autonomous regions and municipalities) and cities have set up a specific institution to administer the development of big data.[6] These details illustrate the importance that Chinese government attaches to the development of big data and more importantly, prefigure a new orientation of social change. The application of big data in urban management, as well as the development of big data technology and industry, has been immersing people in a data deluge and digitalizing the whole society, whereby a smart society is emerging.

The development of big data is a response to the surging demand of smart urbanism, a concept which could trace back to a speech titled *A Smart Planet: The Next Leadership Agenda* given by Sam Palmisano, the Chairman and CEO of IBM U.S., on November 6, 2008. In this speech, Palmisano offered a vision of a world that is becoming increasingly instrumented, interconnected, intelligent and thus smart, with the advancement of digital technologies and the converging of 'the digital and physical infrastructures'.[7] Since then, the concept has been vigorously promoted in the urban planning and city development across the world (Kitchin, 2014b). In China, the construction of smart cities started from as early as 2008 when the concept was first invented (Tang et al. 2020).[8] It was accelerated rapidly in November 2012 when the Ministry of Housing and Urban-Rural Development published the *Notice on Launching the Work of National Pilot Smart Cities* and identified 90 cities as the National Pilot Smart Cities, which had increased to 290 in 2015.[9]

Later, in August 2014, the central government issued the *Guidance on Promoting the Healthy Development of Smart Cities* and at the same time established an institute called 'Inter-ministerial Coordination Working Group to Promote the Healthy Development of Smart Cities', which marks the further centralization of the construction and management of smart cities.[10] In May 2015, the National Bureau of Surveying, Mapping, and Geographical Information published the *Notice on the Work*

[5] Xinhua Net 2017, *President Xi: Implementing the National big data Strategy to Accelerate the Construction of Digital China*, 9 December, accessed 7 April 2020, <http://www.xinhuanet.com/2017-12/09/c_1122084706.htm>.

[6] These big data management departments have different names in different provinces and cities, such as Big data Administration (大数据管理局), Big data Application and Development Administration (大数据应用和发展管理局), Big data Development Administration (大数据发展管理局), Big data Resources Administration (大数据资源管理局), Government Services and Big data Administration (政务服务和大数据管理局), Government Service Data Administration (政务服务数据管理局), and so on.

[7] Palmisano, S 2008, 'A smarter planet: the next leadership agenda', 6 Nov, accessed 20 October 2022, <https://www.ibm.com/ibm/ideasfromibm/za/en/smarterplanet/20081106/sjp_speech.shtml>.

[8] Tang et al. 2020, 'The development status, situation and policy suggestions of New Smart Cities in China', *E-government*, no. 4, pp. 70-80.

[9] General Office of the Ministry of Housing and Urban-Rural Development of China 2012, *Notice on Launching the Work of National Pilot Smart Cities*, 22 November, accessed 20 October 2022, <http://www.gov.cn/zwgk/2012-12/05/content_2282674.htm>.

[10] National Development and Reform Commission of China 2014, *Guidance on Promoting the Healthy Development of Smart Cities*, 27 August, accessed 20 October 2022, <http://old.moe.gov.cn/ewebeditor/uploadfile/2014/12/31/20141231103440380.pdf>.

Related to Promoting the Transformation and Upgrading from Digital Cities to Smart Cities.[11] According to the definition of the Ministry of Natural Resources, the 'digital city' is 'the use of information technology to digitally virtualize the entire content of the city's past, present and future on the Internet'[12], while the substance of the smart city is much richer and more complicated in terms of, for example, the incorporation of the Internet of Things and the City Brain.

In *The Thirteenth Five Year Plan 2016-2020*, it was emphasized that one of the government's major tasks within these years is to 'enhance the construction of modern information technology infrastructure, promote the development of big data and Internet of Things, and build smart cities.'[13] Moreover, in this very document, Smart Agriculture, Smart Energy, Smart Ocean, and Smart Medicine have been also mentioned as other important jobs of the government. On October 9, 2016, President Xi remarked, 'We must have a deep understanding of the role of the Internet in national management and social governance, take the implementation of e-government and the construction of New Smart Cities as the 'handle' [i.e., the focus], and use data concentration and sharing as the means to build a nationally integrated national big data centre'. [14]

There is a terminological, strategical, and practical transition from 'digital City', 'smart city', to 'new smart city'. Tang et al. (2020) interpret that the nature of the New Smart Cities lies in reform and innovation:

> using the new generation of information technology to reshape and reconstruct the cities, using modern information technology to compete with [博弈] the existing order and interests within the cities, employing the attributes of smooth flowing, opening, and sharing of data, to push the unreasonable management systems, governance structure, service patterns, industrial layouts of the cities to become more reasonably optimized, transparent, and efficient (p. 71, translation mine).

Between 2015 and 2017, as Tang et al. (2010) further observe, the New Smart City became a national strategy and the construction of the Smart City focused on the integration and sharing of the government information systems across different departments and administrative levels in order to resolve the problem of 'information silos' (信息孤岛) and 'data stovepipe' (数据烟囱), which are two important phrases frequently occurring in recent years in the government reports and other documents (e.g., in the

[11] National Bureau of Surveying, Mapping, and Geographical Information of China 2015, *Notice on the Work Related to Promoting the Transformation and Upgrading from Digital Cities to Smart Cities*, 7 May, accessed 24 October 2022, <http://www.mnr.gov.cn/zt/ch/szcsjs_30107/zcwj/201506/t20150602_2145046.html>.
[12] Ministry of Natural Resources 2020, Ministry of natural resources website, accessed 24 October 2022, <http://www.mnr.gov.cn/zt/ch/szcsjs_30107/szcsbk/201307/t20130719_2145983.html>.
[13] National People's Congress Standing Committee of China 2016, *The 13th Five-Year Plan for the National Economic and Social Development of the People's Republic of China* (2016-2020), Beijing.
[14] Lin, Q 2016, 'The Political Bureau of the Central Committee of the Communist Party of China conducted the 36th collective study on the implementation of the strategy of empowering the country through the Internet', *Xinhua News Agency*, 9 October, accessed 24 October 2022, <http://www.gov.cn/xinwen/2016-10/09/content_5116444.htm>.

speech of Premier Li Keqiang in the China Big Data Industry Summit 2016[15]) to describe the barriers in the sharing and integration of government data.

In the *Report of Nineteenth National Congress of the Communist Party of China* on October 18, 2017,[16] President Xi put forward the objective to construct 'smart society' which reverberated throughout the society significantly and persistently. On March 4, 2020, the Political Bureau of the CPC Central Committee announced to promote the construction of the 'new infrastructures' including the 5G, ultra-high voltage network, inter-city high-speed railway and inter-city rail transit, charging piles for new energy vehicles, big data centre, artificial intelligence, and Industrial Internet to respond to the slowing economic growth caused by the Covid-19.[17] The building of these new infrastructures could be considered as an important step towards the 'smart society' and 'Digital China'. It seems that a smart society is on its road especially when the People' Bank of China decided in April 2020 to experiment on the digital currency in four cities, Chengdu, Shenzhen, Suzhou and Xiongan.[18] The digitalization of the currency represents an important feature of the construction of this smart society: to make everything traceable, computable, predictable, controllable, and optimizable, from which we can see the intimate engagement between the big data and the smart urbanism.

This kind of engagement can be grasped more concretely from the practices of urban management at the city level. Although real-time techniques have been used for not a short time to monitor and manage the functioning of cities in many aspects, recently there is a new trend to build a single hub addressing different tasks of surveillance, analytics, and decision-making, which is more and more referred to as "City Brain" in the latest literature (see, for example, Feng et al., 2018) and urban management practices. As a new architecture of urban environments, the City Brain, is defined as follows in a neurological way:

> Under the support of the city central nervous system (cloud computing), the city sensory nervous system (Internet of Things), the city motor nervous system (Industry 4.0, Industrial Internet) and the city nerve endings (Edge Computing), a city can achieve the human-human, human-things and things-things information interaction through the city neural network (big SNS [big Social Networking Services]) and achieve the rapid smart response to city services through the city cloud reflex arcs, so as to promote the organic integration of all components of a city, realizing the continuous progress of city wisdom. (Feng et al., 2018, p. 625)

The emerging projects of City Brain suggests that a smart city is a city which thinks, in the literal sense. Feng et al. (2018, p. 625) suggest that big data is "the basis for the City Brain to actually gain wisdom." The flows of data are transformed into the perceptions and thoughts of the cities and then the wisdom

[15] Zai, L 2016, 'Li Keqiang: promoting government information sharing and breaking "information silos", CRI Online, 26 May 2016, accessed 24 October 2022, <http://news.cri.cn/20160526/85526ace-86cc-3d85-7d70-4407ffe73b86.html>.
[16] Communist Party of China 2017, *Report of Nineteenth National Congress of the Communist Party of China*, 18 October 2017, accessed 24 October 2022, <http://www.xinhuanet.com/2017-10/27/c_1121867529.htm>.
[17] 'The central government sets the tone for "new infrastructures": vigorously develop seven major science and technology fields', 8 March 2020, accessed 24 October 2022, <https://www.sohu.com/a/378435951_748530>.
[18] Chen, G 2022, 'The third batch of pilot cities Announced – Digital RMB is integrated in acceleration into life', *Economic Daily*, 3 April, accessed 24 October 2022, <http://www.news.cn/fortune/2022-04/03/c_1128528696.htm>.

of urban management. Fox example, Hangzhou started the project of City Brain in 2016, which now has integrated more than 83.7 billion pieces of data from different departments including transportation, public security, urban management, health, tourism, environmental protection into a central system. Take traffic congestion for example although the application of these data has been extended to broader problems of urban management: Based on the data collected from the cameras and traffic lights, the City Brain could automatically adjust the length of traffic lights and reduce the time of passing the intersections.[19]

Similarly, the Pudong New Area in Shanghai also established a City Brain, the City Operation & General Management Centre, with 11.8 petabyte of data collected from 109 departments and 341 administrative databases by the end of 2019. Take the management of bike-sharing for example: The City Brain has the real time location information for each shared bicycle and could calculate the optimized distribution of the bicycles according to the demographic and geographic data and communicate the results with the bike-sharing companies to adjust the number of the bicycles within each area. [20] A similar scenario occurs when a visitor detection system is installed in the area near the Oriental Pearl Radio & TV Towel, which is one of the most populated areas in Shanghai: The system will make an alert when the number of visitors exceed a limit and the management centre will rearrange the security around this area. [21] In such cases, big data monitors every part of the city at every moment.

During the outbreak of Covid-19, the application of big data in the urban management was further increased and intensified. For example, in Nanshan, Shenzhen, the Bureau of Government Service Data Management used the big data to identify potential infected persons:

> 45.1 thousand telephone calls by artificial intelligence, confirming 4897 persons from high risk outbreak areas, [and] 912 persons reported symptoms such as fever, cough, asthenia and so on; through the Wi-Fi traffic data, examining 58.2 thousand persons declaring medical observation, identifying 713 persons having appeared in public places, [and] 3 persons having passed through the endemic areas in Hubei; conducting the data collision analyses on 580.58 thousand enterprise workers applying for resumption of work, [and] found 328 persons with symptoms of physical discomfort; carrying out the big data analysis on 460.4 thousand vehicles coming to Shenzhen, [and found] 42 thousand persons took Nanshan as their destination.

In this process, the data collected and analysed did not only include 'basic personal information' but also the 'mobile numbers, ID number, visited regions, residential address, health condition, information of enterprises' returned workers, enterprises' difficulties and claims in the resumption of work' and so

[19] Huang, P 2021, 'Give the city a "brain"', *Economic Daily*, 3 March, accessed 24 October 2022, <http://www.xinhuanet.com/info/2021-03/23/c_139828790.htm>.
[20] Li, J & Zhong, X 2018, 'This is the "city brain" of Pudong, Shanghai, which allows refined management to penetrate every street and town', *The Paper*, 8 November, accessed 24 October 2022, <https://www.thepaper.cn/newsDetail_forward_2612696>.
[21] Li, J 2019, 'See how the "city brains" of Zhejiang and Shanghai direct the refined management of cities', 22 July, accessed 24 October 2022, *<http://webzdg.sun0769.com/web/news/content/42044?share=1>*.

on. Moreover, these data were shared across different administrative levels from the city to the communities. [22]

There was also another kind of application of big data during the pandemic, which targeted a much broader population: the Health QR Code (hereafter referred to as 'Health Code') developed by the government and two of the biggest IT companies in China, Alibaba and Tencent. According to Tencent, by March 2020, there were over 800 million people who had used its Health QR Code program.[23] The Health Code was designed for the travel of residents and migrant workers within and across cities. The users would be required to self-report their health condition and other information. Based on the self-declared information, the location, the number of times an applicants have been to the outbreak areas and how long he or she have stayed each time, and the contact history with infected persons,[24] the algorithm would generate a Health Code to each applicant, with colours, say, red, yellow, and green: In Hangzhou, for example, the 'red' means that the holder needs to take a 14-day concentrated or home quarantine; the 'yellow' means that the holder needs to take a 7-day quarantine; and the 'green' means that the holder could pass through the city with the code presented.[25]As such the Health Code functioned as an eclectic approach to mobility control during the pandemic when there was a trade-off between the public health security and the pressing need to rehabilitate the economy, and movements had to be regulated and optimized.

The development of big data and smart city in China is not only reflected in urban planning and management practices but also in the ubiquity of digital devices and technologies. This not only includes the urban sensors and surveillance cameras that are embedded in everyday environments, but also the ways of life they create such as shared bikes and e-bikes, ride hailing and sharing, food delivery, online shopping, digital payment, TikToking (taking and uploading videos to TikTok and other short video platforms), and so on. According to *The 50th Statistical Report on China's Internet Development*, as of June 2022, the number of Internet users in China has reached 1, 051 million (including 1, 047 million mobile phone network users), among which there are 1, 027 billion instant messaging users, 788 million online news (including social media) users, 995 million video platform users, 841 million online shopping users, 904 million digital payment users, and 405 million ride-hailing users.[26] These activities and others constitute a very important part of the (digital) economy and people's daily lives in both

[22] Tang, W 2020, 'Shenzhen: "big data" technologies empower the holographic "battle map" of epidemic prevention and control, *Shenzhen Evening News*, 15 March, accessed 24 October 2022, <https://baijiahao.baidu.com/s?id=1660298473806120484&wfr=spider&for=pc>.

[23] '25 days after its launch, Tencent's Health Code for epidemic prevention has been used more than 1 billion times', *Tencent News*, 5 March 2020, accessed 24 October 2022, <https://new.qq.com/omn/TEC20200/TEC2020030506569900.html>.

[24] Wang, Y & Zhang, S 2020, "When will the health code achieve national interoperability and mutual recognition?", *Legal Daily*, 30 March, accessed 24 October 2022, <http://www.xinhuanet.com/politics/2020-03/30/c_1125785795.htm>.

[25] Zhang, L & Tang, J 2020, 'Hangzhou's Health Code is launched online', *Zhejiang Daily*, 12 February, accessed 24 October 2022, <http://zj.people.com.cn/n2/2020/0212/c186327-33787558.html>.

[26] China Internet Network Information Centre 2022, *The 50th Statistical Report on China's Internet Development*, accessed 25 October 2022, < http://www.cnnic.net.cn/NMediaFile/2022/0926/MAIN1664183425619U2MS433V3V.pdf >.

urban and rural areas. At the same time, they generate an immeasurable amount of data which in turn sustains and conditions these activities, for example, through personalised recommendation and provision of goods, services, and information.

One of the latest and most notable development in digital technology is the popularization of short video platforms such as Douyin (the Chinese version of TikTok) and Kuaishou. The number of users on these platforms grew dramatically during Covid, increasing from 648 million in June 2019 to 995 million in June 2022 (China Internet Network Information Centre 2022, 2019).[27] Take Kuaishou for example. Within the last half year of 2020, the number of average daily active users of Kuaishou's main app is 258 million, and average daily usage time more than 85 minutes.[28] Short video apps are not only platforms for watching videos, but also online shopping platforms and social media on which people share everyday life and acquire information. On the other hand, traditional online shopping platforms such as Taobao and social media platforms such as Weibo in China have also incorporated short video and live video streaming into their apps. For example, by June 2020, on Weibo, users unloaded 2.25 million epidemic-related short videos which had been played 84.2 billion times.[29] What characterizes short video media is not only the length of videos (which are usually within one minute) but also the way in which they organize and present the videos. Users do not need to choose or search for certain videos to watch; instead, short video platforms would 'randomly' recommend a (potentially infinite) series of short videos to them according to their preference, which is estimated by the algorithm based on the data of their past behaviours and actions (e.g., Like, Not interested, comments, following, sharing, the viewing time of each video, etc.). This exemplifies how information is acquired in a big data era when every activity produces and is in turn influenced by data.

However, I observe that along with the development of smart city and the embedment of big data into everyday life, there also emerges a kind of technological unconsciousness, that is the lack of unconsciousness of the social and political consequences of them. While online shopping and payment and short video platforms such as TikTok are becoming increasingly popular, many people might not realize that their consumption behaviour, payment history, and preferences are collected and utilized by the service providers which in turn promote corresponding products or services according to the data. For example, Alipay, one of the biggest electronic payment platforms in China, issues every year the annual transaction report of their customers to the customers themselves. It is very common that people post their annual report on the social media – with important information blotted out – while at the same time being unconscious of the very fact that their each consumption is recorded with the location information. The development and application of big data and other digital technologies in China merits

[27] China Internet Network Information Centre 2019, *The 44th Statistical Report on China's Internet Development*, accessed 25 October 2022, < http://www.cnnic.cn/NMediaFile/old_attach/P020190830356787490958.pdf>.
[28] Real Story Project (eds) 2021, *Anthropology on Kuaishou*, Taihai Publishing House, Beijing, p. 77.
[29] China Internet Network Information Centre 2020, *The 46th Statistical Report on China's Internet Development*, accessed 25 October 2022, < http://www.cnnic.cn/NMediaFile/old_attach/P020210205509651950014.pdf>.

attention especially because of this peculiar symphony of the ubiquity of digital devices technologies and people's indifferent attitude towards it.

In the *China Development Forum 2018*, Robin Li, the president of Baidu, another one of the largest information technology companies in China, argued that

> Chinese people are more open to privacy issues, and relatively not so sensitive. If they can trade privacy for convenience, safety or efficiency, in many cases, they are willing to do so. Of course, we must also follow some principles. If the data can benefit the users, and they are willing to allow us to use it, we will use it. I think this is the basic standard of what we can and cannot do.[30]

It is apparent that Li is trying to defend the enterprise's collecting and utilizing of their users' data. This specious statement, nonetheless, reflects the lack of technical consciousness of both technology developers and users. Although privacy has been increasingly becoming a serious issue in the big data era, I suggest, rather than "Why is privacy never a problem?", we should ask "why is technology never a problem?". The latter is a broader question which does not only concern privacy issues but also other limits and consequences of technology development. The hypothesis that people are willing to exchange privacy, attention and even freedom for convenience, safety, or efficiency is far away from convincing. It assumes that in front of various digital technologies, an individual as a rational agent could choose whether to use it or could maximize her utilities by comparing between privacy and convenience. However, this is merely another plausible imagination of *homo economicus*. Continuing to use the terms from economics, what monopolize this era are not several technology trusts or cartels but instead, the modern technicity or modernity increasingly relying on digital technologies. We cannot help but accept and legitimize these technologies, when big data is so pervasively and deeply embedded into the cities and everyday life. Moreover, this could happen unconsciously: We are captured by digital technologies without even knowing it. It is within this context that I investigate the development of big data in China and its socio-political consequences and suggest that there is especially a need for reflection on how big data and other digital technologies reshape the urban space and the relationships between the human and the city, as well as the existence modes of the human in a big data era, especially in a digitalizing society of China. In next section, I engage with the existing literature in Human Geography and other research fields to lay the ground for discussing these issues.

Section 1.2 The City and the Human in a Big Data Era

To start with, I engage with the definitions of big data and smart city which I do not address explicitly in last section. Doug Laney (2001) defines big data by three V's: volume ('consisting of enormous quantities'), velocity ('created in real-time') and variety ('being structured, semi-structured and

[30] Li, R 2018, *The whole speech of Robin Li on the annual meeting of China Development Forum 2018*, online video, accessed 24 October 2022, <https://v.qq.com/x/page/f0820kbeeg3.html>.

unstructured') (cited in Kitchin and McArdle 2016, p. 1). Extending this definition, Kitchin (2013) further describes big data as 'huge in volume', 'high in velocity', 'diverse in variety', 'exhaustive in scope', 'fine-grained in resolution', 'uniquely indexical in identification', 'relational in nature' and 'flexible' (p. 262). This characterization details the nature of the datasets which constitute big data. Yet I understand big data not only as a specific kind of data but as the ubiquitous, continuous practices and processes of data producing, collecting, capturing, mining, extracting, appropriating, integrating, accumulating, processing, streaming, exchanging, analysing, applying, and so on. These processes could be termed 'datafication'. It is the overall datafication process throughout the whole society, not just the development of digital technologies themselves, that this thesis pays attention to.

Put it in another way, datafication, or datafying, is the rendering of something into data (Mejias and Couldry, 2019, p. 1). It is also the making and remaking of the world(s) wherein everything becomes data (Sadowski, 2019, p. 1). This datafication of the world(s) is not reduction per se but constructs and reconstructs it (or them) (Prince, 2020, p. 1056) by creating new ways and possibilities for the production of space and everyday live. Big data implies not only fundamental paradigm shifts in quantifying and making sense of the world(s) around us such as in sciences, social sciences and humanities research (Kitchin, 2014a) but also the ways in which the world(s) is (or are) produced, experienced and engaged with. The ongoing processes of datafication of spaces, bodies, and everyday lives, on the one hand, suggests a kind of dataveillance (Van Dijck, 2014) – surveillance through data – of both human and nonhuman agents as well as various forms of public engagement and social action against it such as data activism (Baack, 2015) and 'resistance and subversion of massive data collection' (Milan, 2019, p. 220), and on the other hand, how our lives and engagements with the environments produce/become and are in turn influenced, mediated and conditioned by data in a big data era.

This is especially evident in the development of smart city, 'as the epitome of digital ubiquity transforming our spaces, lives and ourselves through data, algorithms' and digital devices (Datta and Odendaal, 2019, p. 388). Smart city, or smart urbanism, on the one hand, represents the pervasive embedding of digital and computing devices – distributed yet networked – into the urban environment, and on the other, the modes of economy, governance and everyday life driven by them (Kitchin, 2014b, p .2). The data, algorithms, apps, devices, networks, and platforms associated with smart city reshape the very fabric and functioning of the city not only by making city infrastructures and services high-tech, interactive, networked, and 'smart' (Serrano, 2018) but also turning everything and everywhere into the site for the production and circulation of data (i.e., for datafication), which, given the scales and rates, could only be apprehended algorithmically (Iveson and Maalsen, 2019, p. 332). The algorithmically controlled flows of data within and across these 'networked, distributed, and flexible sites' (Gabrys, 2014, p. 30) always accompany and influence the flows of every other thing such as humans, vehicles, commodities, services, capital, information, images, sound, symbols and so on within which urban life is unfolded.

Within the context of smart city, the city goes beyond what Manuel Castells calls the 'space of flows' where society is constructed around, social practices work through, and separate locations, activities, and people are connected by flows, especially those of telecommunications (Castells, 2020, Castells, 2010). Rather, information, materials, services, and people do not flow on their own but are connected, collected, monitored, and controlled by and as data (Anthopoulos et al., 2022). The development of the smart city does not only suggest the reconfiguration of urban environments as places but also that of the flows and the ways for managing them. More than spatiality and mobility, by modulating the flows in real time, the smart city further reshapes the temporality of cities and the temporal rhythms of everyday life (Coletta and Kitchin, 2017, Kitchin, 2018, Kitchin, 2019). Thus, Coletta and Kitchin (2017) call it 'algorhythmic governance' – algorithmic rhythm-analysis and rhythm-making. The flows within and across the cities are produced and governed rhythmically in relation to both space and time.

Furthermore, in additional to the embedding of digital devices and technologies as 'the distribution of governance within and through environments' (Gabrys, 2014, p .30), the entwining and integration of data, devices, platforms, and systems, exemplified by the City Brain or other projects of smart city as a hub, also enables the centralized, real-time control of the city and the entire city flows (Anthopoulos et al., 2022, Kitchin, 2014b). This raises the concern that smart city, as the attempts to make a whole city measurable, monitorable, controllable, and optimizable, may become techniques and strategies of discipline for the city and its flows and subjects, by 'distinguish[ing] between the "good" and "bad" city' and citizen (Vanolo, 2014). In another way, by contemplating a city as a collective agent, able to act and be acted on, it also makes the city into a self-regulating body. Krivý (2018) argues that there is a kind of 'cybernetic urbanism', although instead of a homoeostatic self-regulating system as described by early cybernetics, smart city materialises and embodies the second-order cybernetics in which the city is both self-regulating and emergent, and power relations sustain by proliferating and adapting to indeterminacy, nonlinearity, and complexity.

Krivý (2018) further relates this to Deleuzian 'societies of control' wherein there is constant control and modulation of mobility and subjectivity with no ending. Moreover, the society of control represents a form or mode of social control 'less concerned with the surveillance and disciplining of individual subjects' than transforming individuals into 'discrete units of dividual data' and acting on certain patterns and behaviours captured by data (Iveson and Maalsen, 2019, p. 331-2), which, for Krivý and many others, characterises this big data era and may have superseded Foucaultian disciplinary forms of governance. On the other hand, Iveson and Maalsen (2019) suggest that these two modes of power are not mutually exclusive but coexist and work together across the dividual and individual, and that processes of re-assembly and individualisation always accompany those of 'dividualisation'. Evans and Kitchin (2018) also observe that discipline has not been replaced but rather supplements control, as the latter submits to various kinds of failures.

To advance a discussion of the relationships between the humans, digital technologies, and cities, on the one hand, I turn to French philosophers Gilles Deleuze and Félix Guattari's conception of the machine (Smith, 2018), as well as Deleuze's discussion of the societies of control (Deleuze, 2017), and Lazzarato's work on the production of subjectivity (Lazzarato, 2014) which is also influenced by Deleuze and Guattari. On the other hand, I also find resources from another French philosopher Bernard Stiegler's understanding of technology as 'tertiary memory' (Stiegler, 1998). I argue that the work of Deleuze, Guattari and Lazzarato, and that of Stiegler both discuss the relation between humans and machines/technical objects as mutually constitutive: For Deleuze, Guattari and Lazzarato, humans are always a component part of (socio-technical) machines and their reproductive systems (Smith, 2018, p. 102) and on the other hand, the production of the human subject is always a machinic process (Keating, 2022, p. 3) and through its 'enslavement' into different socio-technical machines (Lazzarato, 2014); while for Stiegler, technical objects are the exteriorization of the human body and memory and in turn condition the (techno-machinic) individuation of the human subject (Roberts, 2012, p, 17).

Yet, other than that between the concepts of machines and technical objects, I argue that there are two major differences between them: First, for Deleuze, Guattari and Lazzarato, humans and technical objects are not external to but 'contiguous with' each other, as 'recurrent and interchangeable parts' (Lazzarato, 2014, p. 26) of socio-technical machines; while for Stiegler, technical objects are exterior to the humans (Kinsley, 2014, p. 372). Second, for the latter, the co-constitution of the humans and technical objects is a process of transduction, whereby the humans and technical objects individualise in relation to each other (Kinsley, 2014, p. 372), while for the former, there is not only individualisation (such as in social subjection) but also divisualisation (such as in machinic enslavement) in which the subjectivity of individuals is decomposed into its component parts, that is 'dividuals', and the humans become a part of the machines not as individuals but 'dividuals' (Lazzarato, 2014). However, I do not focus on these differences, but rather take up their discussions to perform different tasks for my research. Through the work of Deleuze, Guattari and Lazzarato, I discuss how big data, smart city, and other digital technologies produce and engage power through the process of datafication, which is also a process of both individualisation and divisualisation. Then, to further de-fetishize big data in response to the technological unconsciousness in the digitalizing society of China, I turn to Stiegler and the work of one of his students, Yuk Hui, in order to discuss the technicity of it, which does not only concern the relationship between the humans and big data but also what constitutes it as a technology. On the other hand, I do build a brief conversation between Stiegler and Deleuze and Guattari (as well as Foucault) in that they offer different solutions for the process of dividualisation or (both psychic and collective) disindividuation caused by the development of modern technology and capitalism, which are two different yet related concepts. But before going to that, I want to first specify the philosophical encounters within this thesis.

First, to discuss the problems of what big data does and how it works, as well as how it changes the human subject's mode of existence, I base Deleuzian societies of control on Lazzarato's discussion about the production of subjectivity (Lazzarato, 2014), which I think could further the understanding about the relationship between control and discipline, between dividualisation and individualisation in a digitalizing and datafying society. According to Lazzarato, the production of subjectivity consists of a relay of two separate yet dependent processes: social subjection and machinic enslavement. In social subjection, people are subject to the socio-technical settings which assign them a subjectivity (e.g., an identity) while in machinic enslavement, the subjectivity of the human is decomposed into its component parts (e.g., memory, habit, intelligence, perception, movement, attention, etc.) which are in turn incorporated into large socio-technical machines, such as corporations, cities, social media, and so on (Lazzarato, 2014).

Machinic enslavement and social subjection are two completely different yet interdependent processes proceeding through 'different holds on subjectivity': The latter works on subjectivation while the former de-subjectivation (Lazzarato 2014, p. 12). Yet it is social subjection that enables the individuals to be enslaved by social-technical assemblages. On the other hand, the 'dividuals' will also be recombined together and re-subjectivized again and then become a part of another assemblage. Therefore, subjectivation and de-subjectivation, or dividualisation and individualisation, coexist and work together in the machinic production of subjectivity, which is a recursive, endless process especially in a big data era: There is continuous production of subjectivity in as much as there is continuous production of data.

Following Lazzarato, I understand machines not simply as technical devices but as socio-technical assemblages or processes and relate this with Deleuze and Guattari's conception of the machine. For them, machines are the bodies which are able to reproduce themselves and which do not have predictable movements or pregiven purposes, 'but instead produce events' (Smith 2018, p. 95). Smith further explains, 'What is not predictable in advance are the capacities that a machine has, which only emerge once it enters into combination with other machines' or into different contexts (Smith 2018, p. 95). It is in relation to their reproductivity and creativity that I understand different big data processes as different socio-technical machines. As shown during the outbreak of the Covid-19, with new problems emerging, big data could perform more and more new tasks and roles which might or might not be expected before, be them liberating or limiting. I call these socio-technical machines which produce, exchange, and work on data 'data machines'. In a big data era, we always live within and between different data machines which modulate and control our movement and behaviour.

Moreover, I understand the society of control as the topological arrangement of different socio-technical machines which are able to produce events, and which constitute of both human and nonhuman agents and in turn constantly produce and modulate their subjectivity and movement with neither ending nor

pregiven direction. Different from previous discussions about digital technologies and control society in human geography and other social sciences, which focus on the relationship of control society to cybernetics (Krivý, 2018) or to Michel Foucault's disciplinary modes of governmentality (Savat, 2012, Evans and Kitchin, 2018, Iveson and Maalsen, 2019), by basing the understanding of the society of control on the production of subjectivity, and the conception of the (socio-technical) machine by Deleuze and Guattari, for whom this concept has a sense of liberating rather than 'enslaving', I intend to look for the 'lines of flight' (Deleuze and Guattari, 1988) within the control society, through which an escape from the regimes of control or a different relationship with digital technologies might be possible.

On the other hand, as Deleuze and Guattari (1987) remark, 'One side of a machinic assemblage faces the strata, which doubtless make it a kind of organism, or signifying totality' (p .4). For them, an organism should not be understood as 'with certain vital matter or "organic" features'; rather, it is a type of body that is centralized, hierarchized and self-directed, 'whose organs are restricted to carrying out certain functions prescribed in advance' (Smith, 2018, p. 103). As discussed above, the application of big data in smart city such as the City Brain also shows a tendency to make a socio-technical assemblage constructed around it into a centralized, self-controlled unity, that is to say, a kind of organism and at the same time, make the humans, digital devices, and other nonhuman agents become a part of the homeostasis mechanism of the city as an organism, which nonetheless could prevent the emergence of new events. It is in relation to the contrast between machines and organisms that I understand the possibilities, good or bad, that the development of big data and smart city could provide to reshape the city, city management, and the relationship between the human and the city.

Then, to investigate the technicity of big data, that is, the qualities which constitute big data as a technology, I present big data as mnemotechnics, real-time technology and cosmotechnology respectively. I first turn to Stiegler's understanding of technology as 'tertiary memory' (Stiegler, 1998). Kinsley (2014, p. 372) notes that there are two major ways among geographers to understand technicity as the relation between humans and technologies, especially those drawing on phenomenological understandings of being and influenced by French philosopher Gilbert Simondon and Bernard Stiegler: The first understands technologies as having the power to 'make things happen in the world' not only when combined with the human body but also on their own; the second renders humans and technologies as 'mutually co-constitut[ing] one another in an ongoing formulation of associated milieus'. Both definitions are crucial for my discussion on the relation between big data and the humans. Following Kitchin and Dodge (2011), I understand big data, as well as other digital technologies, as having the automated agency in not only the making of (technically mediated) space and everyday life but also the production and circulation of knowledge. But I focus more on Stiegler's understanding of technology and following him, I take big data technologies as the exteriorization of the human body and memory. However, adopting a more Deleuzian perspective, I focus on the role of big data in the

digital-machinic production of subjectivity, which consists of both individualisation and dividualisation, instead of merely the techno-machinic individuation of the humans (Roberts, 2012).

Moreover, for Stiegler (1998), technologies exteriorize and pass across generations the social or cultural memory which constitutes the 'already-there' that conditions the temporality of individuation. Yet, I argue, big data as a kind of technics does not only exteriorize sociocultural memory in its inventing and using but moreover, it is a technology that continuously exteriorizes, retains, and re-presents to them, as well as shaping, the memories, and habits of individuals. Therefore, I engage briefly with Henri Bergson to discuss the influence of big data on memory and habit. For Bergson, memories are not stored in the brain or consciousness; rather, the brain is merely 'a filtering or selection mechanism' which allows certain memories to be actualized (Al-Saji, 2004, p. 204, 230). From this perspective, big data does not only store the memories but also participate in the selective actualization of memories by presenting to us who we were in the past through repeated, personalised recommendation, which constitutes what Stiegler (2009) calls the 'short-circuiting' of memories. By repeated recommendation of similar content according to the 'personalised production of subjectivity' (Hynes and Sharpe, 2015, p. 67), big data also appropriates the force of habit, which is taken as both constitutive of subjectivity and obstructive to the production of new subjectivity. On the other hand, I argue that the exteriorization of human memory also constitutes the memories of digital devices – in the form of data – which are necessary for their operation. Furthermore, this (continuous) co-constitution of the memories of humans and digital devices, as 'the co-constitution of the interior and the exterior' (Kinsley, 2014, p. 373), happens in machinic processes in which the boundaries between the humans and digital devices are blurred (Keating, 2022, p. 3).

This does not finish my investigation of the technicity of big data. I also discuss its temporality and more specifically, its realtimeness. Many previous studies have discussed the realtimeness of big data against the background of smart city (Batty, 2016, Kitchin, 2014b, Kitchin, 2017, Kitchin, 2019), but I attempt to provide an ontological rendering of it by taking data as the trace of the past and big data as both recognition of and a failed attempt to capture the process of becoming. The realtimeness of big data, on the one hand, means the 'simultaneity in the occurrence and registering of an event' (Heim, 1993, p .49) and on the other, the real-time experience produced through our encounter with digital devices and technologies. However, Kitchin (2017) notes that real-time systems always include latencies which could result from either the time devices need to perform certain tasks or the modes of interaction between users and systems and which vary across different systems. Therefore, realtimeness is not a given temporality with which systems operate but a temporal condition produced through the socio-technical conditions of the systems (Weltevrede et al. 2014, p. 127). Engaging with a study on the realtimeness of digital media (Hu, 2012), I discuss the desire to live in real time and to capture the ever-passing present in a big data era and argue that delay is constitutive of the real time within which a system operates and the very sense of realtimeness. Furthermore, I argue that delay is not only socio-

technical but also metaphysical, because big data could only capture, in a Deleuzian sense, what we are, which is also what we no longer are, but not what we are becoming (Deleuze, 2007). But real time technologies such as big data do change our experience of the past, present and future by intensifying the influence of the past on the present, by making us know and take part in the present (Uprichard, 2012), and by limiting the possibilities of the making of the future (Kitchin, 2017).

To discuss the technicity of big data and the problem of technical unconsciousness in the context of China, I turn to the discussion of Yuk Hui, one of Stiegler's students, on technology as 'cosmotechnology' in his seminal book *The Question Concerning Technology in China*, which suggests that technology should always be understood in relation to its cultural context (and more specifically, the cosmology proper to the culture). For Hui, technologies are both anthropologically universal as the exteriorization of the human body and memory and not anthropologically universal because 'technologies in different cultures are affected by the cosmological understandings of these cultures, and have autonomy only within a certain cosmological setting' (Hui, 2016b, p. 19). In traditional Chinese philosophy of technology, which focuses on the relation between *Qi* (technical objects) and *Dao* (the unification of cosmological order and moral order), the question of living in harmony with the cosmos or the world is essential to the question of technology. Moreover, I read from Hui's discussion that to live (in harmony with the world) means to free both humans and technical objects from functional determination and I relate this with Deleuze and Guattari's conception of the machine for whom, as introduced above, machines do not have pregiven purposes but produce events. For Hui, this philosophy of technology has lost in modern China with the dramatic economic and technological development, which leads to the problem of technical unconsciousness, which is the lack of awareness of both the limits of technology and human's own finitude (Hui, 2016b). Following him, I argue that in the big data era such technological unconsciousness becomes a kind of data unconsciousness. It does not mean that Chinese people are completely unconscious of the problem that the data of and about them is being produced, collected, and analysed which in turn conditions their choices and decisions. Neither does it mean that they are utilitarianists or pragmatists are willing to trade privacy for convenience. Rather, people's attitude towards digital technologies should be described as 'indifferent'. I argue that it is the ubiquity, ordinariness and embeddedness of digital devices technologies that makes people accustomed and indifferent to their existence and emergence. This indifferent attitude is the reason why the reflection on the relation between humans and technologies is especially important for a digitalizing society in China.

In the discussion of the technicity of big data, I do not limit the scope on its influence on the human, but also apply a posthuman perspective. Besides new (automated) modes of governance, whether distributed or centralized, the relationships between the humans and technologies as revealed by big data and smart city also indicate a posthuman politics which recognizes the multiplicity of beings (e.g., humans, digital devices, infrastructures, energies, etc.) 'participat[ing] in the coproduction of socio-

political collectives' (Sundberg, 2014, p. 33) and spaces, and 'the entanglement of multiple materialities, forces, and agencies of humans and non-humans' (Miele and Bear, 2022, p. 2). The humans do not only live in and through but also 'dwell with' technological objects and the city (Pyyry and Tani, 2019). But the turn towards the agency of digital devices and technologies or the distribution of agency across the assemblages of humans and nonhumans (Häkli, 2018, p. 168) does not simply undermine humans' sovereignty, autonomy or intentionality, as technological processes always intersect with existing and emergent forms of social differentiation (Wilcox, 2017, p. 15). Specifically, big data manifests the imbalanced social-spatial contexts under which it is constructed and could even reproduce these social-spatial inequalities by affecting knowledge production and resource allocation (Graham and Shelton, 2013).

On the other hand, as Rose (2017, p. 780) notes, the human agency in the digital age has been undertheorized, especially when the development of digital technologies has largely changed 'what it means to be human' (van Doorn, 2011, p. 536). Following Stiegler, Rose argues that the human agency, 'always already (digitally) sociotechnical', is not a consequence of, or supplement to digital technologies but coproduced with them, and both mediated through them and diverse, as 'a crucial site that both emerges through and reconfigures digitally mediated cities' (Rose, 2017, p. 780, 789). It is the creativity and diversity of the human agency that I will address in response to the conditioning of big data and other digital technologies of the production of urban space and everyday life. But instead of reinstating the sovereignty of the human subject, I argue that such sociotechnical agency needs to be actualized by the mediation of digital technologies and by recognizing their as well as other nonhuman agency – for example, the capacity of data as flows to establish connection and connectivity.

To imagine alternative ways of life and relationships with digital technologies in the big data era, I turn back to Stiegler, Deleuze and Guattari, as well as Foucault. They all observe that the development of modern technology and capitalism would lead to dividualisation or (both psychic and collective) disindividuation. Of course, there are differences between dividualisation and disindividutaion. For Stiegler, disindividuation implies that 'the individual has lost its capacity to individuate both psychically and collectively', for example, in relation to targeted marketing and personal recommendation in which 'the subject loses the possibility to doubt what is given and to develop his or her own judgment' (Hui, 2015, p. 86). Moreover, this disindividuation is not only destructive to individuals but also of groups by destroying the public and public life, making the 'we' (collectivity of singularities) of into the 'they' (mere buying-power) (see Stiegler, 2006, Hui, 2015, Vesco, 2015). It, on the one hand, implies the 'synchronization of consciousness' and thus a decomposition of style or singularity (Vesco, 2015, p. 100), effected by marketing and advertising activities or/and digital technologies, and on the other, the lack of love for or attention to oneself and others (Stiegler, 2006). However, dividualisation, or de-subjectivation, highlights the process of the decomposing of the subjectivity and the incorporating of its components into different socio-technical machines (Lazzarato, 2014). As discussed before,

individualisation and dividualisation are two different yet interdependent processes which are combined and employed together in the machinic production of subjectivity such as effected by digital technologies, while, at least for Stiegler, individuation is completely opposite to disindividuation.[31]

On the other hand, as Hui (2015) suggests, in disindividuation, individuals are reduced to mere buying-power or mere data, and thus it implies that what marketing or digital technologies target are no longer individuals but 'dividulas'. Although dividuation focuses more on how power works on and is enacted through the component parts of subjectivity instead of individuated subjects, it also implies the inabilities of individuals to question the settings of the socio-technical machines in which they are 'enslaved'. Therefore, disindividuation and dividualisation are two different yet related aspects of the same process in which the human no longer exists as individuated or individualised subject. However, Stiegler, Deleuze and Guattari, as well as Foucault, propose different countermeasures for such process. For Stiegler, the solution is to search for new ways of collective individuation, one example of which is the project that he, Harry Halpin, and Yuk Hui started in 2012 for a new concept of social network different from Facebook (Hui and Halpin, 2013), while for Deleuze and Guattari, as well as Foucault, this collective individuation is not necessary or even not desirable. As Foucault writes in the foreword for Deleuze and Guattari's *Anti-Oedipus*,

> The individual is the product of power. What is needed is to 'de-individualize' by means of multiplication and displacement, diverse combinations. The group must not be the organic bond uniting hierarchized individuals, but a constant generator of de-individualization. (Deleuze and Guattari, 1977, p. xiv)

Therefore, instead of collective individuation, they suggest that what is needed is collective dividualization or de-individualization. In response to the dividualization enacted by digital technologies, and drawing on Deleuze and Guattari, Celis Bueno (2020) further argues, 'we should appropriate the deterritorializing tools that the same technology has made possible in order to imagine a post-humanist future' (p. 88). This is a major methodology that this thesis attempts to follow in rethinking the relationship between the humans and digital technologies.

Furthermore, I engage with Foucault's discussion of 'aesthetic of existence', for whom a life must 'be created as a work of art' (Foucault et al., 1983), to discuss the problem of the stylization of life in the digital era, which aims not to produce a certain kind of subject or smart citizenship, but to create different ways of living with each other, with or without various digital technologies, as Foucault suggests that the stylization of life could 'assume the far more radical form of a being free of one's own self, a non-identity or de-subjectification' (Huijer, 1999, p. 78). Nonetheless, although Foucault would like the stylization of life to be manifested in more enduring relationships (e.g., friendship or love), I follow Nietzsche, in terms of his understanding of the transience of the encounter between people, to rethink the ways of living in the digital era. And I consider 'becoming a digital nomad', which is both

[31] For Simondon, disindividuation is a necessary stage for individuation, whereby a metastable equilibrium is destroyed in order to construct a new one. See Hui, Y., 2015. Modulation after control. *New Formations*, 84(84-85), pp.74-91.

a figure derived from the work of Deleuze and Guattari (see Lundy, 2013, Sutherland, 2014) and an emerging way of life in the digital age, as both a slogan for and a general way and attitude of living with digital technologies, exploring new possibilities and events, and making new and maybe temporary connections.

Section 1.3 Encountering the Digital(izing) Society in China

Based on these theoretical understandings on the relationships between the human, city, and technology in a big data era, I empirically investigate the development of smart city and short video platforms in China. I engage more with the actually existing infrastructures and practices than what are described in smart city proposals to draw a picture about 'the actually existing smart city' (Shelton et al., 2015) and digitalizing society in China. Specifically, from smart city to short video platforms, I want to discuss how big data influences two aspects of everyday life, city life and media life, the former of which refers to people's daily interaction with urban infrastructures and environments and the latter their life on social media platforms. These two aspects are not independent as people's interaction with urban environments also increasingly relies on social media. The reason why I put together and contrast them is more empirical as I notice that people could be more sensitive of the changes of the apps that they use than those of the urban environments around them. In addition, I also use these two different aspects of everyday life to discuss different political implications of the development of big data and smart city, in relation to Deleuzian societies of control, as well as posthuman politics.

The empirical data is collected both from online materials including government documents, news reports, social media articles, etc. and from the fieldwork I conducted between December 2019 and January 2020 and in June 2020, in which I interviewed face-to-face nine government officials from sub-city level big data and technology management departments in three cities (Jinan, Qingdao, and Weifang) of Shandong Province of China, which are pilot cities of New Smart City in Shandong, and two researchers of big data and digital economy from Institute for Studies in County Development of Shandong University, located in Qingdao, and one from Weifang Research Institute of New Economy about the local development and policies of big data and smart city. I also interviewed ten ordinary citizens living in different cities about how big data influenced their everyday life especially during the pandemic, among which seven were interviewed on telephone and three face-to-face.

These interviews were semi-structured, the interviewees were coded according to the time they were interviewed, and numbers were used for government officials and researchers and roman numbers for citizens. There were three government officials in Weifang I interviewed privately who both talked about the local smart city development and shared their own engagement with digital technologies as ordinary citizens and were thus doubled counted and coded. These interviews were about 60 minutes in

length and were digitally or manually recorded with consent. Besides, I also organized an informal seminar in Hangzhou, in which I invited seventeen young people including undergraduates and those working in different industries to discuss the relationship between big data, everyday life and subjectivity from their own perspective. A large part of the empirical analysis is also based on my own experience during the last two and a half years (from December 2019 to June 2022) when I stayed in China and could not return to campus because of the travel ban in Australia as well as other issues.

According to these materials, including auto-ethnographic accounts, quotes from interviews, and analyses of documents, I present and analyse a number of exemplar vignettes, or stories about smart city and short videos platforms (and other social media), to illustrate the urban management and everyday life in the digitalizing society of China. The vignettes do not provide a general, thorough description of the whole society but instead, through 'detailed qualitative description' (Miller and Brewer, 2013, p. 7), allow us to look at the ordinary pieces of life in which people encounter big data and other digital technologies again and again. They are not fictional stories but follow a narrative style of storytelling. Rabbiosi and Vanolo (2017) note that stories and storytelling styles are growing popular among geographers. A notable example is one of Rob Kitchin's latest books, *Data Lives*, in which he uses personalised documentaries, modified dramatizations of events, or even fictional tales to engage critically, as well as playfully, with the production, collection, and utilization of data (Kitchin, 2021). He argues that with a reflexive standpoint, and various forms of narrative devices, storytelling could be 'a powerful way of communicating ideas and providing a critical lens to consider society and social processes and change' (Kitchin, 2021, p. 7). Rabbiosi and Vanolo (2017) further argue that it allows us to go beyond the opposition between fiction and non-fiction, or between truth and untruth, as many creative forms of writing in cultural geographies do.

However, adopting this style, the thesis aims not to blur such line. Rather, at the same time as providing an in-depth analysis of the phenomena investigated, I highlight the banality of them through the presenting of the vignettes – they are just ordinary stories of everyday life. Although compared with case studies, as suggested by Leszczynski (2020), vignettes often do not show methodological or empirical cohesion, they highlight the role of heterogeneity and diversity which has always been valued by Geography (Rabbiosi and Vanolo, 2017, p. 273). Despite the ubiquity of digital technologies that I emphasize throughout the thesis, mobilising different vignettes, I investigate the different relationships between humans, cities, and technologies in a digitalizing society. It should also be noted that these vignettes are not independent but could be cross-referenced to each other here or there. For example, some vignettes could together describe the modes of life which are realized or even imposed when people engage with digital technologies, while these modes of life are easily disrupted or shifted in other vignettes. By juxtaposing these vignettes, I attempt to show the contingency and heterogeneity of human-technology relations.

In the rest of this chapter, before going to the structure of the thesis, I want to introduce more about the organization of the empirical part. First, I present what a smart city looks like in China and highlight the ubiquitous visibility of digital devices and smart infrastructures. When contemplating the possibility of ubiquitous computing in 1991, Mark Weiser, the father of ubiquitous computing, suggested that computing would be distributed in and through the environments and thus become invisible (Weiser, 1991). Yet what is remarkable for the digitalizing society of China is the ubiquitous visibility of digital devices and smart infrastructures – they can be seen everywhere, although computational operations themselves might be invisible or inaccessible for users. I understand these devices and infrastructures as 'the material organization of time-sharing social practices that work through flows' (Castells, 2010, p. 442), which might be themselves mobile or fixed in certain locations, but the streams of data flowing within and across them modulate the movements of both human and other nonhuman agents and thus make the pulses or rhythms of the city and city life. Moreover, it is in these devices and infrastructures that people see and engage with every day that the power relations operate instead of disappearing into the environments. Rather than surveillance and privacy, my focus is on the (digital) ways of life that smart devices and infrastructures create and represent. By 'ways of life', I am referring to Foucault's usage of it in relation to 'how power emerges and operates within [certain] ways of life' and how alternative ways of life are possible (Gabrys, 2014, p. 36). I further argue that the routineness and banality of everyday activities which produce and are in turn conditioned by data is fundamental to the production of the human body and subjectivity which fit the big data era (Datta and Odendaal, 2019, p. 338).

Then I introduce the City Brain project as an effort to incorporate different urban management data and databases and online management platforms, connect and manage together different sensors, cameras, and infrastructures, and integrate different services and responsibilities of different government departments in a single hub, management system and platform. As a data platform, the City Brain, first of all, digitalizes and datafies an entire city, and produces a 'digital twin' (Batty, 2018) for it which enables the global, dynamic, and constant monitoring of the city. With this sensibility, the City Brain as a city management centre could achieve refined management which, on the one hand, requires the real-time sensing, identifying, and responding to the problems occurring in the operation of the city and on the other, the rendering of personalised services according to the profiles of citizens, households, and communities. By further investigating of the structure of the City Brain and the analogy that information technology engineers and urban authorities draw between the city and human body, I argue that the City Brain does not only enable a city to sense, think, make decisions and act by and for itself but also through 'the organic integration of all components of a city' (Feng et al., 2018, p. 2), making it into a hierarchical, centred and self-controlled organism. I also investigate the role of the humans as both essential infrastructures of smart city and a constitutive part of the self-regulating mechanism of the city as an organism. On the other hand, through the distinction Deleuze and Guattari draw between machines

and organisms, I argue that apart from regularizing and normalizing processes, smart city could also provide citizens with more possibilities to experiment with different ways of life and different ways of dwell in and with the city.

I also investigate the application of big data in controlling the mobility of people and the spread of the disease during the outbreak of the Covid-19 and more specifically, the emergence and development of the Health Code. Based on my own experience, interviews and online materials, I discuss how during different phases of the pandemic the modes of movement control shift from complete lockdown to digitalized control of movement, in the former of which movement is strictly limited if not almost impossible while in the latter people are allowed to leave the building in which they live and go to public places only if their Health Code is green. For me, this represents a shift from Foucaultian disciplinary modes of control to Deleuzian modulatory modes of control. I further take up Lazzarato's conception on the machinic production of subjectivity and Deleuze's societies of control to discuss how the Health Code works on both individuated subjects and 'dividuals' and enacts universal, constant, and endless modulation of the movements of people. I also discuss how the datafied human body becomes part of the socio-technical machine of the Health Code which in turn conditions its movement.

After this, for the part of media life and to discuss the epistemological and political consequences of big data, I turn to short video platforms to discuss the influence of big data and social media on the production of voice, as social media has become, on the one hand, one of the most important sources from where people get information and knowledge and on the other, one of the most public spaces where people express oneself and communicate with each other while it has been increasingly relying on big data to organize, deliver and present its media content. Gabrys (2016) suggest that smart city requires smart citizens and citizenship, and that 'the ability to have a voice and participate within the communicative registers and exchanges enabled through digital technologies' is crucial to this smart citizenship (p. 220). I argue that whether one could have a voice and be heard by others is influenced by digital technologies such as big data themselves. For big data does not only undermine the value of the human voice with its role in knowledge production but also, through particular content delivery and recommendation mechanisms, conditions the extent within which one's voice can reach on social media.

To advance the discussion, after engaging with existing literature about the epistemological revolution brought by it, I discuss how big data participates in producing knowledge and establishing truth or truthfulness not only in academic research but also in its operation within social media platforms and thus produces its own voices. I argue that the inference about what type of person a user is and their preference is a kind of knowledge which is implied in and fundamental to the functioning of big data and that although this knowledge is not inaccessible to the human, it nonetheless belongs to big data rather than any human subject. This changes how we should understand knowledge and its relation to the human subject. Moreover, as big data increasingly becomes a new way to establishing truthfulness

not only for scientific facts but also our life, which can be reflected when people say, 'Big data knows about me better than myself', there is the potential or danger that what big data says and represents could replace the voice of the human. This is how I understand Chris Anderson's (2008) claim that data can 'speak for themselves'.[32] I do not ignore the problem that the generation of data and algorithms is not free of (imbalanced) socio-geographical contexts or human bias (Kitchin, 2013, Kitchin, 2014a), while I suggest that big data could have their own voice which gives accounts of people's everyday life.

Then I further illustrate how the human voice could be displaced by data. I first highlight the meaning and value of voice through the discussion of Nick Couldry (2010), a sociologist of media and culture, for whom voice, as 'a basic dimension of human life', is 'the process of giving an account of one's life and its conditions' (p. 7). I then discuss how big data as both processes of aggregating (within which numerous people's lives and stories are compressed into a data set) and individuating (such as in the targeted marketing) makes the voices of the individuals to be expressed and heard as they are represented by data. Lastly, I present a case study of a short video platform, Kuaishou, which claims that everyone can record and share their life and 'every [or everyone's] life can be seen' on it.[33] I observe that short video platforms, as well as other social media, have become important places for people to share experiences and feelings, express opinions and seek for support and help especially during the pandemic. By taking attention or 'traffic' (i.e., the number of visits a video obtains) as a kind of resources, I discuss the role of big data in the distribution of attention and its influence on whether one's life could be seen, or voice could be heard. And I argue that although short video platforms and other digital technologies for taking and watching videos provide new capacity and possibility for seeing (different ways of life) and being seen, this possibility is largely conditioned by big data and the algorithm and being seen is different from being heard, the latter of which requires effective communication and affective resonance, which seems to be increasingly hard in an era of big data and social media.

Therefore, I discuss the influence of big data on the development of what Cass Sunstein (2006) calls 'information cocoons' and the formation of public opinion and collective voice. There are both empirical and theoretical concern in this discussion. During the pandemic I noted that the divergence and conflict between opinions, beliefs and 'facts' were enlarged, and people found it increasingly difficult to communicate with others holding different opinions, who often used such terms as 'split world' and 'information cocoons' to characterise and problematize their life on social media and the Internet. It was assumed that big data and other digital technologies limited the information one could obtain or be exposed to and thus entrenched preconceptions and prejudices to the extent that public opinion was hard, if not impossible, to develop. This is related to the discussion on the societies of

[32] Anderson, C 2008, 'The end of theory: The data deluge makes the scientific method obsolete', *Wired*, 23 June, accessed 1 August 2022, <https://www.wired.com/2008/06/pb-theory/>.
[33] Research Institute of Kuaishou 2020, *The Power of Being Seen: What is Kuaishou?*, Citic Press, Beijing.

control. Following Lazzarato, Krivý (2018) argues that 'public opinion is central to how power is enacted in the society of control' as it is through the modulation of attentions, desires and opinions that power operates and sustains (p .19). I argue that the influence of big data on public opinion does not need to be understood in terms of whether it incites or discourages certain opinion as the constant, personalised modulation of the information that people are exposed to, which is not always marketing-oriented, could direct individual and public opinions in a directionless, unpredictable way and even make public opinion as both collective voice and social action difficult to develop. Moreover, I argue that public attention has to some extent displaced public opinion as the latter is reduced to how much attention is drawn to a certain event and that with personalised, never-ending streams of news and entertainment, short video and other social media platforms modulate people's attention to the extent that we could almost focus no nothing and thus few (bottom-up) social changes are achieved through public attention. However, for a counter strategy against big data's capturing of public opinion and public attention, I suggest that there are alternative ways of engaging with digital technologies to create and live in public spheres as 'possible shared worlds' (Terranova, 2007) where 'unplanned, unanticipated encounters' (Sunstein, 2002, p. 9) could happen and different voices and actions for generating commonality could be generated (Rosanvallon, 2006, p. 250).

In order to intersecting this with the context of a digitalizing society of China, I discuss how in the last half year of 2022, during the longest lockdown in Shanghai to date, citizens used digital technologies, such as WeChat, a social media and instant message platform, and online group buying, to establish connections and get through the difficult period of food and medicine supply shortage together. From this example, and engaging with the discussion of Stiegler, Deleuze, Guattari and Foucault, I suggest that digital technologies are not inherently restrictive and that different relationships, or different ways of living, with them are possible. If we go back to what I call the original functions of it, data is not only a form of information or a medium that stores information; it is also the flows which makes connections, which connects people with each other and with other nonhuman agents including technical objects. What I want to present in my thesis is exactly the ubiquitous, continuous producing and flowing of data which generates different connections, be them liberating or limiting. This is one of the major contributions that the thesis makes.

The following chapters are organized as such: Chapter II and III set up the philosophical context for the thesis, Chapter IV, V, and VI further the discussion with empirical analysis, and Chapter VII the conclusion. It should be noted that in this thesis the division between the theoretical part and empirical part is not rigid: In Chapter II and III, empirical evidence is also employed from time to time to clarify theoretical discussion and lay the ground for empirical analysis in later chapters, while in Chapter IV, V and VI, theoretical discussion also occurs to echo previous chapters or to carry forward the argument in relation to the empirical evidence. This organization might make the thesis appear to be more theoretical than empirical, but as the concept of 'cosmotechnics' suggests, we cannot discuss the

development of big data and its influence on the relations between humans, technologies, and cities without the socio-cultural context, and thus there is not purely 'theoretical'. On the other hand, all the theoretical discussion originates from and serves the author's empirical concern about big data and the digitalizing society of China.

In Chapter II, 'The Humans Between the Data and the City', I take up Lazzarato's discussion on the production of subjectivity, Deleuze and Guattari's definitions of the machine and the organism, and Deleuze's conception of the societies of control to provide a theoretical understanding of what big data and smart do and how they operate, as well as the relation between the human, digital technologies, and the city, in relation to these three threads of philosophical ideas. Section 2.1, titled 'Digital-Social Subjectivation', discusses the social subjection or subjectivation aspect of the production of subjectivity in the context of big data and argues that big data creates, in Lazzarato's (2014, p. 24) words, 'a signifying and representational web' from which no one could escape, especially with its conditioning of everyday life. Through a brief encounter with Whitehead, I understand data as traces of the 'perpetually perishing' of time (Whitehead, 1978, p. 340), and argue that in the continuous production of subjectivity big data could not capture the process of becoming. I also justify why I investigate in the empirical part the influence of big data on these two aspects of everyday life, city life and media life. Section 2.2, 'The Data-City-Machine', turns to the machinic enslavement aspect of the production of subjectivity and relates Lazzarato's discussion with Deleuze and Guattari's conception of the machine. By taking big data as a socio-technical machine, I highlight its capacity to produce something new. Then I discuss the existence mode of the human as data and through the contrast between the machine and the organism Deleuze and Guattari's conception, I discuss how big data and other digital technologies could make a city into a self-regulated body. Section 2.3, 'A Society of Digital Control', discusses the ubiquity and continuity of control in a big data era, disengages the society of control from a cybernetic reading while understanding it as composed of different socio-technical machines, and engages with Lazzarato (2006)'s discussion of 'noopolitics' to discuss how the modulation of public opinion becomes the central problem of digital modes of control. This section aims to locate the space from where we can fight against ubiquitous, continuous modulation and control within the regime of control itself.

In Chapter III, 'Technicity of Big Data', I investigate the technicity of big data through the engagement with three philosophers, Stiegler, Hui, and Bergson and the research of some human geographers and digital media researchers. In Section 3.1, 'Big Data as Mnemotechnics', following Stiegler and Hui's understanding of technology as 'tertiary retention' and Bergson's discussion of memory and habit, I discuss how big data appropriates the force of memory and habit especially in relation to the production of subjectivity and how it constitutes the memory of both the human and digital objects. Then, in Section 3.2, 'Big Data as Real-time Technology', I employ a phenomenological understanding of living in and experiencing real time to investigate the realtimeness of big data and argue that it is an illusion as latency

is fundamental to the real time in which big data systems operate, from both technical and metaphysical perspectives. In Section 3.3, 'Big Data as Cosmotechnology', on the one hand, drawing on Hui's reading I find similarity between the cosmotechnical thinking in traditional Chinese philosophy of technology and Deleuze and Guattari's conception of the machine in terms of technical objects' being free from functional determinations; on the other hand, I take up Hui's understanding of technology as 'cosmotechnology' to discuss the problem of technical unconsciousness in the context of a digitalizing society of China and suggest that the relation between the human and digital technologies should be rethought and reinvented based on this context.

Chapter IV, 'Smart City with Chinese Characteristics', investigates empirically the development of the smart city in China. Rather than taking the empirical materials as separate case studies, I mix and combine them together to assemble an exemplary smart city. Therefore, Section 4.1 is titled 'Assembling a Smart City' in which I introduce different smart infrastructures and digital devices that are emerging or already quite common in many cities of China. Then I investigate the City Brain and Health Code in Section 4.2 and 4.3 respectively. Chapter V, 'Data, Voice and Opinion', discusses the epistemological and political consequences of big data through the investigation of short media platforms. In Section 5.1, 'As the Big Data Says', I emphasize the role of big data in producing knowledge and establishing truthfulness in relation to everyday life rather than academic research. Section 5.2, 'Voice and Data', discusses how data could undermine the value of human voice and Section 5.3, 'A Split World', the relationship between big data and public opinion. Then, in Chapter VI, 'Becoming a Digital Nomad', drawing on Foucault's discussion of the stylization of life, I discuss alternative ways of living with digital technologies through the case study of the Shanghai Lockdown. These three chapters together constitute the empirical part of the thesis, the details of which are already introduced above. The last chapter, 'A Political Economy of Data or Traces', is the conclusion, in which I revisit the idea of taking data as traces and go through the discussions that I have made in previous chapters.

Chapter II. Humans Between the Data and the City

Section 2.1 Digital Subjectivation

A web of big data

In 2013, IBM estimated that 2.5 quintillion (10^{18}) bytes of data are produced every day, which doubles every few years.[34] Nonetheless, as Kitchin and McArdle (2016) suggest, it is velocity and exhaustivity, rather than volume, that are key traits distinguishing big data from traditional forms of data, as the former attempts to capture an entire population or system in real time (see also Kitchin, 2014a). Graham and Shelton (2013) argue that because of the unevenness of social-spatial contexts, big data captures the entities (e.g., people, places, and processes) which are 'easier to enroll in such vast sociotechnical assemblage' (p. 258) while at the same time omitting others. Manovich (2011, p. 470) further remarks the classed structure of people in terms of their access to big data: for example, 'those who create data (both consciously and by leaving digital footprints), those who have the means to collect it, and those who have expertise to analyze it'. However, I argue, with its wide application not only in different research fields but also in many aspects of city management and everyday life, what is interesting about big data lies in its capacity to create, in Lazzarato's (2014, p. 24) words, 'a signifying and representational web' from which no one could escape (especially the vulnerable) although its influence is uneven.

The popularization of smart devices and digital technologies has enabled people to engage with big data at any time and place. In so far as smart phones and other digital devices are part of our daily life as well as extensions of our body, we are always producing and being influenced by data. For instance, in 2014, at least 10 billion messages, 4.5 billion 'Likes' and 350 million photos were generated on Facebook per day.[35] Moreover, the interaction between humans and big data happens in real time, as their behavior is recorded and responded to by the latter immediately. Take the short video media platform Douyin, the Chinese version of TikTok, for example. One of the most important features of Douyin is that users do not need to choose or search for certain videos to watch. Instead, the platform 'randomly' recommends a (potentially infinite) series of short videos to the users. Every action (e.g.,

[34] Jacobson, R 2013, '2.5 quintillion bytes of data created every day. How does CPG & Retail manage it?', 24 April, accessed 24 January 2019, <https://www.ibm.com/blogs/insights-on-business/consumer-products/2-5-quintillion-bytes-of-data-created-every-day-how-does-cpg-retail-manage-it/>.

[35] Marr, B 2014, 'Big data: The 5 Vs everyone must know', 6 March, accessed 1 August 2022, <https://www.linkedin.com/pulse/20140306073407-64875646-big-data-the-5-vs-everyone-must-know/>.

Like, Not interested, comments, following, sharing) of each user and her viewing time of each video is then recorded. Based on this data, the algorithm infers the preferences or 'types' of the users and adjusts the videos recommended accordingly. Such process is both continuous and recursive. For a user, the next video presented to her is unknown, but when the video pops out, she might realize the reason why this video is recommended to her is because she has watched this kind of video before for many times. But the algorithm's characterization of her changes all the time with the change of her behavior. Between the movements of fingers on our smartphone screens is the continuous drawing and revising of so-called 'user portraits' (see, for example, Yao et al., 2019).

Within the context of the increasing popularity of platforms such as Douyin and personalised recommendation algorithms, Lazzarato's work on the production of subjectivity is crucial for us to understand what big data does and how it works. As a technology enabling the real-time profiling and characterizing of human behavior, big data functions through and as a new apparatus for the production of subjectivity, wherein individuals are defined and influenced by the data they produce or provide. For Lazzarato, the production of subjectivity consists of two processes coupled with each other: 'social subjection' and 'machinic enslavement' (Lazzarato, 2014, p. 23-9), which are two terms he borrows from Deleuze and Guattari (Deleuze and Guattari, 1987, p. 456-9). In social subjection, or subjectivation, people are subject to the socio-technical settings which assign them a subjectivity, that is to say, 'an identity, a sex, a profession, a nationality, and so on', through which 'individuated subjects', as well as 'their consciousness, representations, and behavior', are produced for the social division and management of labour (Lazzarato 2014, p. 12). Associated with these subjectivities are the roles and actions expected for individuals. For example, as a full-time PhD student, which is an identity given to me by the university, I am required to finish and submit my dissertation on time and I was told on the first day of enrolment that I should work on campus from 9 am to 5 pm during weekdays, although this is not compulsory.

Yet, the production of subjectivity does not end with individuated subjects. While social subjection manufactures individuated subjects, another process, that is machinic enslavement, occurs at the same time which dissolves the individuality of the subject on both the pre-individual and supra-individual levels and decompose subjectivity into its component parts, which, following Deleuze (1995), Lazzarato calls 'dividuals':

> Not only is the dividual of *a piece with* the machinic assemblage but he [sic] is also *torn to pieces* by it: the component parts of subjectivity (intelligence, affects, sensations, cognition, memory, physical force) are no longer unified in an 'I', they no longer have an individuated subject as referent. Intelligence, affects, sensations, cognition, memory, and physical force are now components whose synthesis no longer lies in the person but in the assemblage or process (corporations, media, public services, education, etc.). (Lazzarato 2014, p. 27, emphasis in original)

In machinic enslavement, the human agent no longer exists as an individuated subject, but as 'dividuals'. Moreover, the component parts of subjectivity are incorporated into a larger machinic assemblage.

'Machinic', 'assemblage' and 'enslavement' are all important concepts for the philosophy of Deleuze and Guattari (see, for example, Deleuze and Guattari, 1987, Guattari, 1995). Although this thesis does not engage with them in details, I want to briefly clarify how Lazzarato uses them to make his argument. To start with, the concept of assemblage is as obscured as it is diverse, since Deleuze and Guattari never developed 'a fully fledged theory' of it (Nail, 2017, p. 21, citing DeLanda, 2006). This said, Anderson and McFarlane (2011) define the Deleuze-Guattarian assemblage as 'a "constellation" of elements that have been selected from a milieu' (p. 125), which does not reveal the rich connotations of this concept (for a more comprehensive discussion see Dewsbury, 2011), but provides a basic understanding of it. However, Watt (2016) argues that assemblages are 'neither constructions formed out of pre-determined parts and nor are they simply random collections of parts' (p. 300), but rather, citing Wise (2011), 'a becoming that brings elements together'.

For Lazzarato, an assemblage is a collective constituted together by human and nonhuman agents, with the latter in particular referring to technological machines, but should not be reduced to a mere collection of humans (as users) and machines (as tools) (Lazzarato, 2014, p. 29, 40). Rather, in an assemblage, we could 'no longer distinguish between human and non-human, subject and object' (Lazzarato, 2014, p. 13). Moreover, a machinic assemblage should not be equated with a technical system per se. For Lazzarato, machinic is synonymous with what Guattari calls 'molecular' (Guattari and Rolnik, 2007) which 'indicates a difference in kind and not in scale with the molar dimension of individuated subjects' (Lazzarato, 2014, p. 31). Enslavement, as 'the mode of control and regulation' of a machinic assemblage, does not work with humans and technological machines as individuated subjects and objects but with the molecular components of them (Lazzarato, 2014, p. 25-7). Considering a university as a machinic assemblage, for example, I do not only become part of my university as an individual student; moreover, my intelligence and labour, among its other components, are disassociated from the unity of my subjectivity while becoming operating pieces or modules of the university.

Machinic enslavement and social subjection are two completely different yet interdependent processes proceeding through 'different holds on subjectivity': The latter works on subjectivation while the former operates through a kind of de-subjectivation (Lazzarato 2014, p. 12). Yet it is social subjection that enables individuals to be 'enslaved' by socio-technical machines. As Lazzarato (2014, p. 29) puts it, 'Subjections and subjectivations serve these social and technical machines and every person's functions and roles are assigned through them.' On the other hand, the 'dividuals' enslaved by a socio-technical machine will also be recombined together and re-subjectivized again, and then become part of another socio-technical machine, as social subjection 'assure[s] the reterritorialization and recomposition of subjective components "freed" by the machinic enslavement of the individuated "subject"' (Lazzarato, 2014, p. 36). The production of subjectivity is a recursive, endless process, which is especially the case in the big data era: This time, I am a PhD student; next time, a Chinese male; then,

a fan of Marvel movies …. In this and the next section, I discuss respectively the processes of social subjection and machinic enslavement within the context of big data and smart city, but it is important to remember that, for Lazzarato, these two processes cannot be separated from each other, 'for it is at their point of intersection that the production of subjectivity occurs' (Lazzarato, 2014, p. 12-3).

Returning to the empirical example of Douyin, drawing an inference about 'What kind of short videos does a certain user like to watch?' is not merely a statistical problem; rather, it is more about assigning to each user an identity (e.g., a fan of Marvel movies, an oversea student who is learning how to cook, a parent having two naughty children) and corresponding preference. It is not that the user is never, say, a fan of Marvel movies, but no matter whether she is or is not, she would be considered as having such an identity for the simple reason that she might have watched some clips of *The Avengers* at some point in the past. Rather than being 'discovered' within them, subjectivities are thus produced and assigned for individuals. The personalization of the videos recommended and presented to users are based on the fine-grained classification of both media content and users. In this case, certain types of users/consumers are 'produced' respectively for certain types of videos. This production of subjectivity could have both representational and substantial meaning: One is both taken as and made into someone, as she might become what the algorithm assumes she is. Thus, we produce data, while data also produces us. The production of data and that of subjectivity are two parts of the same process with either of them capable of acting as input or output depending on the assemblage in question: … – data – subjectivity – data – … ad infinitum.

There is an illusion that big data might know more about us than we do about ourselves. It often seems that big data is able to reveal what one likes or who she is, in terms of which she herself does not even realize. For example, suppose I do not know I like to watch Marvel movies until Douyin keeps recommending clips of them to me on multiple occasions and suddenly it occurs to me that I do in fact like Marvel movies. But why would I like to watch clips of Marvel movies? Is it that, because I am already a fan of the *Iron Man* and have watched some clips on Douyin, the algorithm keeps recommending related videos to me? Or is it that, because Douyin recommends some videos about Robert Downey, the actor of *Iron Man*, and I watch them accidentally, I gradually 'become' a fan of Marvel in some way? Although there are no definitive answers, we know from Lazzarato's analysis of the production of subjectivity that the processes implied in these two questions are intermingled with one another during the engagement between humans and big data. Through targeted advertising and personalized recommendation, big data produces and reproduces subjectivities by reinforcing people's habits and strengthening their behavior: It could be that I am not a big fan of Marvel but there are not many videos of other types for me to watch. In this case, big data reduces the possibility for individuals to become 'other', to become someone else instead of the 'persons' represented and defined, and thus delimited, by data. In other words, big data works 'at the cost of the potentiality of the bodies it captures' (Colebrook, 2020, p. 338), by creating a 'subjectivity trap' from which it is difficult for one to escape

once being caught in. This is why Lazzarato's concept of the production of subjectivity is significant for understanding the power relations in the big data era, although this section only focuses on the aspect of social subjection and leaves the machinic enslavement part for discussion in Section 2.2.

Data as traces

This digital-social subjection has its ontological implication, to investigate which I propose that we should relate two concepts, subjectivity, and trace, to each other. One way that we might come to understand data is in relation to the concept of trace, which has a strong association with the work of French philosopher Jacques Derrida. But before turning to the broader theoretical context of this concept, I want to illustrate first how I understand data as traces: Everything that exists leaves traces. These traces are not traces of beings per se but rather of events, of ever-fleeting moments of our lives. Imagine a fawn walking in the snow which leaves a row of footprints behind. These footprints are not a trace of the fawn but of a moment, or an occasion when a fawn happens to walk in the snow. For most traces, we might be unaware of them or could not perceive their existence. Moreover, even for those traces we care about, what we call 'precious memories', we cannot keep or remember them perpetually because of the limitation of our human faculties. However, by ubiquitous, continuous, and real-time recording and storing, big data creates a way to capture the trace of every event happening around us, especially those passing under the radar of our usual modes of perception, and to keep and remember these traces as long as possible – just think about how long a hard disk could be used, not to mention cloud storage.[36] Data, on the one hand, is the preservation and representation of these traces, of what we were but we no longer are and on the other, a kind of trace itself.

For Derrida, the concept of the trace is synonymous with retention. A trace is the retention of a past which does not only inhabit the perceived present but 'must constitute it through the very movement of difference it introduces' as 'nonpresence' and 'nonperception' (Derrida, 1973, p. 64, 67). Shain (2019) argues that in Derrida's writings we could also find the idea of the 'trace of the future'. The perceived present is not only compounded with the retention of the past but also the anticipation or protention of the future. Thus, traces are the marks of the past element and present element within the constitution of the present (Derrida, 1982, p. 13). In other words, the trace is a term that Derrida uses to theorize the relation of the present to the past and the future, as well as to itself. However, by understanding traces as the traces of events, I engage this concept more materially: They could be either retention or material effects (or side effects) of events. Here my research question is not about how traces constitute the experience of the 'living present' (Derrida, 1973, p. 85), but how the development of big data indicates

[36] Of course, data have their duration and will be deleted in a period of time, especially when the intended purposes for the collection of them are achieved (Kitchin, 2021, p. 100-12).

a kind of traceology in which beings and processes are reduced to traces. It is this rendering of ontological status to traces that I think leads to the problems of big data as an apparatus for subjectivation. To further this idea, I turn to Alfred North Whitehead, the twentieth century philosopher, most well-known for his process philosophy, drawing on whom I understand data as traces of the 'perpetually perishing' (Whitehead, 1978, p. 340).

What big data, as both a technology and process of datafication, 'cares' about are exactly the data trails that bodies generate or leave. These data trails are collected and appropriated not only for providing feedbacks to the bodies that generate them but for generating more and more new data. We could compare this process with that of the succession of 'actual occasions' as contemplated by Alfred North Whitehead, the twentieth century philosopher, most well-known for his process philosophy: Each occasion brings 'the "data" from previous occasions into a new moment', which itself becomes data for future occasions (Duvernoy, 2019, p. 175). Here I turn to Whitehead because, I suggest, big data attempts to imitate and capture, through the continuous production of data, this process of the successive happening of actual occasions at the heart of his process philosophy. A key tension in Whitehead's metaphysical scheme lies between the 'historic route of inheritance between actual occasions' and the production of novelty as unactualized potentialities '"ingress" into actual occasions in differing degrees and intensities' (Duvernoy, 2019, p. 175, 177). Big data is a technique that modulates the ontological tension between the craving for novelty and the nostalgia for traces of the past. As Whitehead remarks,

> The world is thus faced by the paradox that, at least in its higher actualities, it craves for novelty and yet is haunted by terror at the loss of the past, with its familiarities and its loved ones. It seeks escape from time in its character of 'perpetually perishing'. (Whitehead, 1978, p. 340)

Big data does recognize the perpetually perishing of time, in response to which it introduces a continual process of memorizing and re-presenting. In so doing, big data replaces what Whitehead calls 'actual occasions' with traces. Yet 'the world of actual occasions is a world of perpetual loss' (Duvernoy, 2019, p. 175) while, at least theoretically, data as traces could exist forever. These traces are re-presented to us again and again, for which a typical example is the photo widget on iPhone or other smart devices which present to us the pictures taken in the past.

Despite its velocities and timescales, big data still fails to fully capture the processes of becoming. It always lags behinds the flowing of time and mistakes what we are for what we were or what we will be. As mentioned above, to personalize the goods, services or media content provided to users, big data attempts to characterize the 'persons' behind data – this is what Lazzarato conceptualizes as the process of social subjection. Yet there is a paradox of big data as an apparatus for social subjection. The production of subjectivity under big data should be a continuous process: With streams of new data and information endlessly flowing in, new subjectivities would be produced constantly and thus there should be no fixed subjectivity assigned to individuals. There should be no subjectivation at all, but only high-speed, continuous filming of people's movement and behavior. In this sense, big data is a camera, which

produces only images, striving to capture the ever-fleeting moments of our lives.

Big data admits changes and attempts to capture the changes of events in real time, while at the same time uses the traces of what we already no longer are to predict what we will become. The only way for it to become real-time is to predetermine the choices one would have and condition the process of becoming through participating in the production and reproduction of subjectivities. The 'realtimeness' of big data (see Kitchin, 2014b, Kitchin, 2017, Weltevrede et al., 2014) will be further discussed in Section 3.2. Although the content (goods, services, information, media content, etc.) recommended to users could change with their actions or preferences, the algorithms that operate on big data tends to create a series of 'subjectivity traps', with individuated subjects jumping from one trap into another. As such, the algorithmic logics associated with big data reduces becoming to the shift between subjectivities conditioned by it. The repeated recommendation of similar or related content leads not only to boredom which causes people's disinterest but also brings about a sense of drowning. We are drowned in the subjectivities that big data puts us into, from which we are so desperate to escape but often cannot.

Life under big data

One of the major themes of this project is how big data influences and conditions the ways of life. By 'ways of life', I am referring to Foucault's usage of it, who understands this concept in terms of 'how power emerges and operates within ways of life' as well as how alternative ways of life are possible (Gabrys, 2014, p. 36). Surely, life has many aspects and in this project my research scope is limited to two of them, urban life and media life, the former of which refers to our daily interaction with urban infrastructures and environments and the latter our life on social media platforms. At first glance, these two aspects of everyday life seem to contrast with one another as the former involves more our engagement with physical space and the latter more digital space. However, this distinguishing between physical space and digital space no longer holds when more and more digital devices are embedded within urban infrastructures (see, for example, Evans and Kitchin, 2018, Gabrys, 2014, Kitchin, 2014b). On the other hand, what we call the virtual is as real as the physical. This is not only because of the development of digital technologies which provide 'more accurate contextual and geographical detections' of our reality but also because of the materiality of digital devices and online platforms themselves (Hui, 2016a, p .48). The reason why I put together these two aspects of everyday life is more empirical: I have observed in my empirical research that people are more sensitive to the changes of the apps they use than those of the environments around them in terms of the development and application of big data. They tend to believe that smart city is a concept 'far away from' them but at the same time, they are not unaware of how big data affects, for example, the goods they purchase or the information

they receive. It is such difference in people's (un-)consciousness towards big data that interests me and drives me to investigate together these two different aspects of life influenced by big data, and the problem of data unconsciousness will be further discussed in Chapter III.

What I call media life is not only an important part of everyday life; rather, the latter has been experiencing ongoing mediatization as people's lives are 'inseparably infused with media' (Deuze, 2014). In this sense, what I call urban life is also a mediatized urban life as our interaction with urban infrastructures and environments relies on all kinds of social media tools. The development of big data brings something new to media life: If our lives are already conditioned by the media content presented to us (e.g., the highest-ranking restaurants nearby) and that we produce (e.g., a post on Facebook about our favourite restaurants), big data affects the kind of media content we are exposed to and thus the lives under the influences of them as well as the circulating of the media content we ourselves produce and the feedback we receive for them not only from other people but also from algorithms. In other words, the mediatized everyday life is further mediated by big data. It does not mean that only through mediating the streaming of media content that big data influences people' lives. On the other hand, we could observe that it invades everyday life in various ways.

The first and foremost change brought by big data is that it turns our daily life into a process of data production. In the digital economy, production, data production, and the production of subjectivity are inseparable and indistinguishable (Lazzarato, 2014, p. 45-6). Take again Douyin for example. As a short video platform, it does not produce much media content itself and most of the videos are made and uploaded by users. What Douyin produces are exactly the differentiated and individualized users and the subjectivities assigned to them, who are both the producers and consumers of the videos. Therefore, the videos are nothing more than an intermediary, while the subjectivities and data are what are really produced, exchanged and appropriated in this platform economy (see Armano et al., 2022 for a comprehensive discussion about platforms and subjectivities). The revenue of the platform which comes from advertisers to some extent implies the 'prices' of subjectivities. An interesting fact is that such short video platforms would pay the users for their watching of videos. For example, on Kuaishou, another popular short video platform in China, people can receive credits for their watching of videos and these credits can then be changed into cash or gifts. We could either consider this payment as an incentive to encourage people to use more and more of the app, or as the wage paid to the users not only for the labour invested in watching videos but also for the data they produce. This method of making of people's daily life a process of data production and collection is also important for urban management, which could be well illustrated by the invention of the Health Code during the outbreak of the Covid-19. In this example for the application of big data, people's everyday movement becomes the most important data source, which will be analysed in greater detail in Section 4.3.

To further discuss the influence of big data on people's lives, we first need to investigate its role in

knowledge production and resource distribution. First of all, as it brings about an epistemological revolution across many different research fields, big data plays a more and more important role in knowledge production (Back et al., 2013, Kitchin, 2014a). In a seminal editorial for *Wired* magazine, Chris Anderson suggests that that big data indicates an era of the 'end of theory': 'Correlation supersedes causation, and science can advance even without coherent models, unified theories, or really any mechanistic explanation at all. There's no reason to cling to our old ways.'[37] In other words, big data can speak for itself, to the extent that we no longer need any prior theory or hypothesis because we can seemingly extract correlations from data and make predictions based on them. This is how knowledge is produced in the big data era. Graham and Shelton (2013, p. 258) further remarks that big data seems to be 'a meme that speaks to and produces new ways of establishing truth'. Of course, the 'datalogical turn' in human geography and other social sciences, of which the revolution brought by big data is a continuation, has been criticized by many academics (see, for example, Barnes, 2013), but we cannot deny that big data does not only challenge traditional epistemologies in scientific research but also influence the production and spreading of knowledge and discourse in our daily life.

I think the latter is more important for my discussion here. As people increasingly rely on social media (and the Internet in general) to obtain information and knowledge and the latter on big data to deliver content, it determines to a large extent what information one could get through the Internet. It is an important task to understand how big data affects knowledge production from the perspective of individuals rather than on a social level, that is to say, how individuals develop their knowledge about the world under the influence of big data. On the other hand, I suggest, we should not only focus on the knowledge of humans. Instead, we could also turn our eyes to the knowledge of machines and more specifically, for the sake of my project, that of algorithms. By the latter, I am referring to the knowledge machines have about both humans and nonhuman agents and about themselves. For example, the knowledge about what type of persons one is when an algorithm decides to recommend what kind of videos to her, which is just like the impression a human has about another human.

Such kind of knowledge is seldom presented to humans and neither does their production require the direct participation of them. They are the basis for the production of subjectivity. We could also say they are two sides of the same process. Yet this different way of understanding the subjectivity produced for and assigned to an individual as the knowledge of the algorithm itself provides a balance, to keep it from being too human-centred, for a project like mine which aims to investigate human existence in a big data era. It is machines or algorithms that produce such subjectivities and such knowledge, although, as Kitchin (2014a, p. 5) suggest, not without the influence of human intention or bias. Of course, there are more kinds of knowledge that machines could have, such as, in the context of urban management,

[37] Anderson, C 2008, 'The end of theory: The data deluge makes the scientific method obsolete', *Wired*, 23 June, accessed 1 August 2022, <https://www.wired.com/2008/06/pb-theory/>.

the knowledge of a City Brain about the operation of the city. This thesis highlights the agency of big data in the knowledge production not only in academic research but also in everyday life, but this does not mean it is ignorant of the power dynamics at play in the production of algorithms, data, and artificial intelligence themselves such as discussed by Broad (2018) and Crawford (2021) or the imbalanced socio-spatial context within which they are produced (Graham and Shelton, 2013). Rather, it aims to argue that there is an implicit process of the production of knowledge and subjectivity within the operation of digital devices and technologies and during people's everyday engagement with them, a process which is nonetheless beyond people's perception and understanding as a black box.

By participating in knowledge production, big data also conditions resource distribution. Rather than resources in general, I focus on a specific kind of resources which only emerges with the development of digital economy or platform economy. This resource is usually called 'traffic' (流量), which represents the number of visitors and their viewing time of certain media content. Traffic, on the one hand, measures the attention of the public on certain media content and on the other hand, the influence of this content and its uploader(s). We could return to the example of short video platforms. Due to the recommendation mechanism, the number of visitors of a video depends not only on its own quality but on how many times it has been recommended to the users, which is determined by big data. For instance, according to the recent trend of the numbers of visitors and 'Likes' of a video, the algorithm would increase or decrease the recommendation frequency of the video and thus there could be a kind of 'snowball effect' that videos with many visitors are likely to get more and more visitors while others with few visitors would gradually get unnoticed. But no one knows in advance which video would get more traffic and which get less: A video could suddenly get popular – i.e., 'go viral' – or be forgotten for no reason. On the other hand, traffic is a kind of goods which people can purchase form the platforms: If they pay for it, the platforms will increase the recommendation frequency of their videos.

As traffic conditions the influence of different media content – including but not limited to how many times they are viewed – it largely affects the producing and spreading of information, discourse, and knowledge on social media platforms. For example, it might be easier for an influencer with high traffic for the content she posts than normal people to affect people's opinion. It is common nowadays that traditional news media, universities, governments, and other institutions create accounts on new social media platforms to publish information as they need to rely on these platforms to maintain or enlarge their influence and that they also need to compete for traffic with other users. Moreover, as many users would intentionally produce media content in accordance with the logic of the recommendation mechanisms to get high traffic, the relationships between big data, knowledge production and resource allocation on these platforms becomes more complicated. Yet traffic is not only an important resource for influencers, institution uploaders or content uploaders who are identified or identify themselves as 'self-media' or 'We-media' (自媒体) but for all users of social media, as almost everyone uses it to

share their life, express opinions and get attention from others – or simply put, to speak and be heard – with or without the aim of becoming an influencer themselves. It determines the scope within which one's voice could be heard and to what extent one can influence others in their beliefs, opinions, preferences, and choices. The knowledge-power relations around big data and traffic will be further discussed in Chapter V. It should be made clear here that the major concern is not how traffic as a new resource affects the producing and spreading of information but rather, how this is conditioned and influenced by big data.

Section 2.2 The Data-City-Machine

Big data as a machine

> We no longer act nor even make use of something, if by act and use we understand functions of the subject. Instead, we constitute mere inputs and outputs, *a point of conjunction or disjunction* in the economic, social, or communicational processes run and governed by enslavement. (Lazzarato 2014, p. 26, emphasis mine)

To further investigate the modes of existence of humans in a big data era, I turn to what Lazzarato considers as the other side of the production of subjectivity, that is, machinic enslavement. This concept provides a tool for understanding the internal-to-each-other relationships between humans and data: On the one hand, data flows in and out of the human bodies and transforms the latter into a data field, in contrast to a magnetic field. On the other hand, we are not merely data producers or providers external to them; instead, we have become part of data, of the machinic assemblages constructed by big data, not as individuals but rather as 'dividuals'. A process entirely different from social subjection occurs during our engagement with data, wherein individuated subjects are decomposed and 'the component parts of subjectivity (intelligence, affects, sensations, cognition, memory, physical force) are no longer unified in an "I"'. The synthesis of 'dividuals' does not 'lie in the person but in the assemblage or process (corporations, media, public services, education, etc.)' (Lazzarato, 2014, p. 26) as big data forges them into gears, screws, or cogs of different machinic assemblages.

It is worth emphasizing that for Lazzarato, machinic does not mean mechanical or technical, but rather molecular. When he talks about human agents as points of conjunction or disjunction, he does not refer to individuals because for him, agents are not the persons but 'decoded flows' below or above the individual level (Lazzarato, 2014, p. 28). Individuals only temporarily occur and dissipate quickly (Evans and Kitchin, 2018, p. 47). Not only is the individuality of humans destructed; there shall be neither individuated technical objects: Their unity is decomposed, and their functions rearranged and repurposed in machinic assemblages. Not to mention that there is no individuated data set since data is already 'dividuals'. In other words, we shall not take data as datasets or databases, but as numbers without any structured organization or presentation. As such the components of subjectivities, technical

objects, and data are rearranged and recombined in machinic assemblages or processes.

In such processes of machinic enslavement, such as in the construction of smart city, the relationship between humans, urban infrastructures, technical objects, and digital objects (e.g., data and algorithms) (on the concept of digital objects see Hui, 2016a) has been changed: They become 'recurrent and interchangeable parts of a production, communications, consumption, etc., process that well exceeds them' (Lazzarato 2014, p. 26). Thus, there is no reason to contemplate data as signals between humans and machines so that there is a structured system of humans-data-machines, or humans-data-machines-data-humans, as described in the cloud reflex arcs of the City Brain for which humans are both receptors and effectors of data. Rather, humans, infrastructures, digital devices, data, and many other agents are located on a single plane of ontological consistency and form an assemblage and I call this assemblage a 'data machine' because it produces, circulates, and appropriates data, and the connection, conjunction and disjunction of its component part is also established on the streaming of data. Nonetheless, this is merely a designation, without presupposing the centrality of data in such kind of machines. As I will discuss below, the concept of machine being used draws heavily upon Deleuze and Guattari's understanding of a machine as a decentred, non-hierarchical body.

Here, then, I do not distinguish between the concept of machine and that of assemblage but equate machines with machinic assemblages. Following Deleuze and Guattari (1987), neither do I differentiate between technical machines and social machines as all technical machines are also social machines, and thus they are socio-technical machines. For me, drawing on the work of Lazzarato as well as Deleuze and Guattari, the machine is a mode of connection, conjunction and disjunction of its components that include more than the mechanical, electronic, or digital elements composing its technical form. A machine is at the same time an assemblage and a process. There are flows and forces beyond a machine's technical form, which nonetheless is part of it. For example, a smartphone, as a machine, consists not only of a battery, an antenna, a screen, a speaker, a camera and so on but also apps, operating systems, cellular signals, base stations, telecom service providers, the user who is, say, watching videos and the media content displayed …. Simply put, a machine has its social components and functions other than technical ones.

It is too easy to take machinic enslavement literally and highlight its restricting or 'enslaving' sense. But machinic enslavement is not simply a repressive process; rather, I argue, it is a productive process of machine-forming or machine-making. We should understand the processes of machinic enslavement in relation to the concept of 'machine' itself, for which I turn to Deleuze and Guattari as it is through them that Lazzarato develops his ideas about machinic enslavement. For Deleuze and Guattari, 'machine' is a concept they use to criticise against the notion of 'structure' (Dosse, 2012, p. 135). As Guattari (1984) writes in the *Machine and Structure*, '[t]he emergence of the machine marks a date, a

change, different from a structural representation' (p. 112), and he further argues, '[t]he human being is caught where the machine and the structure meet' (p. 114).

Daniel Smith (2018) summarizes three characteristics of machines in Deleuze and Guattari's conception of the machine: having no predictable movements but producing events; having no purpose; being able to reproduce themselves (p. 95). We can examine whether these characteristics apply to big data. First, there is no doubt that data can reproduce themselves, with huge volumes and dramatic velocities, and moreover, algorithms, digital devices and infrastructures are also reproducible although their reproduction needs the facilitation of humans. But, as Smith (2018, p. 102) asks, 'Why not argue, then, that we humans are simply a part of the reproductive system of machines?' For one thing, as discussed above, humans have become a part of the data machine; for another thing, by participating in the production of subjectivity, big data produces the demand for its own production, for example, when people say 'Big data knows us well. It should be used in more places.' In this sense, to use Deleuze and Guattari's terminology, the reproduction of big data is enacted by the 'abstract machine' (Deleuze and Guattari, 1987, p. 7) of big data, which I have termed 'data machine'.

Secondly, big data has been applied in various fields, such as business, health, education and government, and its application could be extended to other fields without much effort. Besides, the tasks and functions that big data could perform are also beyond imagination especially with it being increasingly embedded into our daily life. Smith (2018, p. 99) notes that the capacities of a machine are not limited in advance but rather emerge out of its combination with different machines in different contexts. Deleuze and Guattari (1987) remarks,

> We know nothing about a body until we know what it can do, in other words, what its affects are, how they can or cannot enter into composition with other affects, with the affects of another body […] either to exchange actions and passions with it or to join with it in composing a more powerful body. (p. 257)

As shown in the case of the Covid-19, with new events continually emerging, big data could take more and more new roles which might or might not be expected before. For example, in the case of the Health Code, big data functions as a kind of electronic pass card or a digital barrier which controls people's movement, while on the information platforms of medical supplies, it performs the task of facilitating the allocation of supplies. Obviously, there is no certain pregiven purpose for big data.

Third, the operations of big data could produce events. For Deleuze, Smith argues, the notion of 'event' is a way to understand the production of something new or novelty (Smith, 2018, p. 100). In the previous subsection, I argued for the incapacity of big data in either capturing or unleashing novelty in the process of subjectivation because it reduces the possibility for individuals to become 'other'. However, considered as a data machine, big data does contribute to the production of something different. While social subjection manufactures individuated subjects, machinic enslavement disassembles individuals and incorporates the component parts into a larger assemblage. It is in the repetition of this dual process

of subjectivation and de-subjectivation that a machine reproduces and transforms itself and produces events. As for big data, these events could be new ways of its application and people's new responses and reactions towards them.

Moreover, Smith further argues, 'when a machine or combination of machines produces an event, it does not simply remain what it was before, but is itself transformed in the process' (Smith, 2018, p. 101). If we understand machines as machinic assemblages, consisting of the elements beyond their technical forms, I suggest, why not argue that the events a machine produces are also a part of it and thus that to produce something new is to reproduce and transform itself, and vice versa? The reproduction of a machine itself is the event. What are produced are not only new subjectivities, new data, new technical or digital forms (e.g., new algorithms) or new ways of application but the whole data machine. Or, to put it differently, the connection, conjunction and disjunction of points and the points conjunct or disjunct to each other have changed in the production of something different, as I have argued that a machine is the conjunction and disjunction of its elements. Here I am suggesting that adjusting the way of the connection, conjunction and disjunction of points could be a strategy against the machinic enslavement of big data, which will be further discussed in Chapter VI.

This characterization of big data as reproductive, purposeless, and creative aims not to employ Deleuze and Guattari's conception of the machine, as well as Smith's (2018) reading of it, to define whether big data is a machine, but instead to remind us as a machine what big data could do. It is in relation to their conception of 'machine' that I read machinic enslavement as a process of machine-making and understand big data as a data machine that produces data, subjectivity, and events. Moreover, the conception of the data machine suggests another task that should be addressed: What kind of insights (and challenges) does big data bring to the conception of 'machine' and humans-machines relationship? Does big data further decentre human agency so that we are nothing but a part of data and data machines? In a big data era, does every machine become a data machine? If so, what are the differences between data machines and traditional machines? We could argue that with artificial intelligence, cloud computing and other techniques, big data could make machines totally automatic and autonomous, which could operate, calculate and even think on their own, but this argument would become meaningless if in a broad sense of machines, we have already taken human agency as a part of machines and their reproductive systems, that is to say, machines are automatic and autonomous given that human and nonhuman labour is never external to them.

There is also another way to contemplate the existence mode of data machines, which is to take them as a hybrid of, or an interface between, the physical and the digital. Since everything could be digitalized or datafied in the big data era, everything is both physical and digital. It seems that there is a world of the digital wherein there is a 'digital twin' for each thing in the physical world. This is actualized to a certain degree by the projects of 'city digital twin' which aim to create a digital duplicate for a city

simulating its functions and processes (Shahat et al., 2021). Data machines connect and traverse the physical and the digital, through which the changes of the former can be transduced into the latter, and vice versa. Furthermore, it is within the data machines that the physical and the digital coexist.

However, the physical and the digital are not ontologically contrary to each other. What we call 'the digital' does not simply refer to, for example, a virtual image of a person or a digital copy of an object (e.g., a point on a digital map representing a vehicle moving around). Rather, the digital encompasses the realities captured, represented, characterized, and created or to be created by digital technologies. The development of big data manifests this actuality of the digital by showing us how data works in the production of subjectivity and of realities. The difference between the physical and the digital is not larger than that between the social and the technical, or between the social and the economic. Nor is the digital merely a representation of the physical (Thrift, 1996). Rather, I argue, they are different relations of forces. Therefore, data machines do not only mediate between the digital and the physical but incorporate them as such, together with the technical, the social, the economic, the political, the aesthetic, and so on. These relations of forces traverse human and nonhuman agents, technical objects, digital devices, and data as points of conjunction and disjunction. On the other hand, it is these points of conjunction and disjunction and their movement, rather than structure, that produce these relations of forces. As such there is no difference in genetic conditions between the physical and the digital, and the incorporation of the digital does not change the nature of machines as assemblages of points of connection, conjunction and disjunction.

On the other hand, I argue that the development of big data formulates a new form for machines. Here I am not referring to artificial intelligence or advanced robots but rather, machines as data. If we find that in this big data era, humans and nonhuman agents have become data, why could we not also argue that machines have become data? What I am suggesting is that we could take points of connection, junction and disjunction in a machine as data points and machinic enslavement as data mining and data governance. Although for Deleuze and Guattari, the notion of 'machine' is employed against that of 'structure', the ambiguous connection between machine and structure could still be sometimes misleading. Thus, could we make a brave move to abandon the framework of 'machine' and directly look at the connection, conjunction, and disjunction of points? This conception of 'machines as data' totally disposes of the boundary between the outside and the inside with the extensiveness and scalability of data. The wholeness and unity of data is contingent: A set of data must be constructed to be a dataset; otherwise, data points could be separate, without any meaningful connection between each other.

Becoming data

Lazzarato (2014) defines 'enslavement' as 'the mode of control and regulation ("government") of a technical or social machine such as a factory, business, or communications system' (p. 25). I suggest that in an era of big data, machinic enslavement is identified with data governance, which includes both the using of data in management and the management of 'data'. These two 'data' have different meanings: The second refers not only to data in the normal sense of the word but also to 'dividuals' as the components of a data machine. Pace Lazzarato, I argue that data governance is the mode of control and regulation of a technical or social machine in the big data era. The first step of data governance is the datafication of individual entities. Here datafication does not simply mean digitalization or informatization but the *becoming data* of individuals, which consists of two aspects in relation to the two senses of the concept of 'data': being represented as and by data on the one hand and becoming 'dividuals' on the other. In the first process, that is what Lazzarato understands as 'social subjection', it produces a datafied 'I', a digital twin and the human subject is displaced by the data it generates; while, in the second, that is machinic enslavement, individuated subjects are decomposed into data points, 'dividuals', or points of conjunction and disjunction. Subjectivities are at the same time constructed by and through data and decomposed into 'data'.

But what kind of new nature does the conceiving of 'dividuals' as data attaches to them? And what implications does data governance being a new mode of control and regulation of socio-technical machines have? I think the ontological implications should be discussed together with political implications, which I will discuss further in Chapter IV and V. Here I would like to illustrate the existence mode in the big data era by an example of food delivery drivers in China, who always struggle between the requirements of the food delivery platform and the rules of traffic systems. In many cities, delivery drivers usually use electric bicycles to deliver food, which are not very safe compared with other vehicles. On the other hand, the required time to finish each order is quite limited: For example, they are usually expected to deliver an order within 30 minutes, which is basically impossible under normal circumstances; otherwise, their wages will be deducted. In this case, they have to break the traffic rules (e.g., running a red light, driving on motor vehicle lanes or in a direction not allowed), which causes a lot of traffic accidents. It is reported that 'in the first half of 2017, in Shanghai, an average of one delivery driver was injured or died [because of traffic accidents] every 2.5 days.'[38]

The problem is that the required delivery time for each order is decided by a Realtime Smart Delivery System, as the platforms calls it. The System collects the data of each driver about, say, how long they took to complete previous orders, and which route they chose for each. According to these data and other geographic information, the System will determine the required delivery time and recommend the 'best' route for the delivery. It turns out that the faster a delivery driver finishes her tasks, the shorter

[38] Lai, Y 2020, 'Delivery drivers, trapped in the system', 8 September, accessed 18 August 2022, in Chinese, < https://mp.weixin.qq.com/s/Mes1RqIOdp48CMw4pXTwXw>.

time she has for the next. According to a manager from a food delivery platform, 'in 2016, the longest time for a 3km meal delivery was one hour. In 2017, it became 45 minutes. In 2018, it was shortened by 7 minutes, frozen at 38 minutes.'[39] The gradually reduced time with no doubt leads to higher possibility of traffic accidents. For the Delivery System, what matters is not delivery drivers as individuals or their behavior (of obeying or disobeying the traffic rules) but the data of their delivery time for each order. Their labour and time but not others, such as their health and safety, has become 'data' of the platforms.

On the other hand, with the development of projects called Smart Traffic, the traffic system also increasingly relies on big data. An example is now the timing of traffic lights is controlled by big data. Just as the delivery system only calculates how long a driver takes to finish a delivery without considering how many red lights he or she has to run, the traffic system modulates the timing of traffic lights in each crossing to optimize the overall traffic condition but fails to understand how anxious a delivery driver is rushing through the intersections to complete her job in time. The result is that delivery drivers are 'trapped' between and within these two socio-technical machines. Not just them, in this big data era, is not everyone living within and between different machines which are in nature or increasingly becoming a data machine?

Cities as organisms

In this subsection, I am going to further discuss the relationship between big data, humans, and machines, but in another specific context of smart cities. A smart city is characteristic of, on the one hand, the pervasive and ubiquitous embedment of digital and computing technologies into urban environments, which has been called 'new infrastructures'[40] in China and on the other, the economy and governance driven by such technologies (Kitchin, 2014b, p. 1). But above all, the concept of the smart city is enacted through the digitalization and datafication of city space. With the development of big data and smart cities, everything (e.g., humans, vehicles, building, infrastructures, etc.) and every activity occurring in every moment can be sensed, recorded, and digitalized by the network of numerous cameras, sensors, smart phones and other electronic or digital devices.

This process of digitalization is not simply the registering of entities and events but consists of the dynamic, real-time mapping of the city. Especially through the city general management platforms, which are often called 'City Brain' recently, a vast number of information is collected and integrated together, and a city, together with the numerous activities happening in it, is re-constructed and re-

[39] Ibid.
[40] For a detailed definition of 'new infrastructures', see: China Network Television 2020, 'The National Development and Reform Commission has clarified the scope of "new infrastructure"', 21 April, accessed 9 August 2022, <http://www.mofcom.gov.cn/article/i/jyjl/e/202004/20200402957398.shtml>, in Chinese.

presented on a large screen (as shown in the picture below) as well as in the digital space. In this process, the city space is decomposed into pieces and recombined again to form a larger assemblage. The real time display of the city dynamics, on the one hand, requires the constant functioning of the electronic and digital devices spread all over the city and, on the other hand, calls for the immediate responses of humans to all kinds of emergencies (or non-emergencies) occurring in the city. Through the connection, conjunction and disjunction of humans, nonhuman agents (including but not limited to various digital and electronic devices) and space, the city becomes a 'megamachine' in and of which 'a multitude of uniform, specialized, interchangeable' elements are 'marshaled together and coordinated in a process *centrally organized and centrally directed*' (Lazzarato 2014, p. 32, citing Mumford 1967, emphasis mine).

In the city-machine, every event, process, and the space, as well as the movements and activities of each individual, are constantly monitored and influenced by big data technologies, especially with the development of such project as Smart Transportation, Smart Health, Smart Education, Smart Manufacture, Smart Agriculture, Smart Government and so on. There is a pan-smartism in this era of big data: Everything is, or should be, smart – although this might be more rhetorical than substantial in many cases. Moreover, there is pan-smartization of machines, whether technical or social, in which 'smart' means automatic, rational, intelligent, able to make and optimize decisions. We could observe in the development of the smart city concept a tendency to transform the city itself into a machine with artificial intelligence. However, as I have discussed above, if we have already taken humans as a constituent part of machines, the endowing of machines with artificial intelligence does not either provide much new insight for our understanding of the concept of 'machine' nor does it expand the capacities of machines. Rather, it just further alienates humans, depriving our pride as 'smart beings', and making human and nonhuman agents more and more interchangeable.

On the other hand, the construction of smart cities is not only a process of *becoming machines*, but also of *becoming organisms* (or even *becoming human bodies*), of cities. There is 'a parallelism or isomorphism between the body and the city' wherein they are considered 'as analogues, congruent counterparts, in which the features, organization and characteristics of one are reflected in the other' (Grosz, 1995, p. 105). This kind of isomorphism is not merely metaphoric or representational, but rather practical and empirical, reflecting the ambition and endeavour of urban planners and engineers to 'vitalize' cities, to make them a city-being. For example, according to the *All-optical Smart City Whitepaper* published by National Information Centre of China, a smart city should not only have a brain (i.e., a decision system) but also features and limbs, which refer to different technologies of 'Smart Interaction' linking the physical world and the digital world, such as 5G, IoT (Internet of Things) and Cloud services, and a trunk which are the technologies of 'Smart Connection' including 5G, optical

fibres and other communication infrastructure.[41] In addition, as I have described in Chapter I, a city brain should have its reflex arcs, nerves and nerve endings. With such organs, the city could sense, think, judge, coordinate, make decisions and act just like humans. This vision of smart city does not only expand or redefine the capacities of the city but more importantly, gives an organism-like structure to it. It presupposes as its ideal model 'an organized cohesive, integrated body, regulated by reason' (Grosz, 1995, p. 107), which, on the one hand, provides a justification for this blueprint and the development of smart urbanism in general and on the other, suggests that the development of smart cities is a dual process of both mechanization and vitalization: that is to say, of both becoming machines and becoming organisms/bodies.

Of course, a city is not a living being. Yet we should not understand 'organism' as with certain biological matter or '"organic" features or properties that are unique to them' (Smith 2018, p. 103). Rather, I suggest, we could understand a city as an organism in relation to Deleuze and Guattari's conception of it, for whom

> The word organism, rather, describes a type of body that is organized in a certain way, namely one that is 'centralized', 'hierarchized', and 'self-directed'. The 'organs' […] are understood by Deleuze and Guattari on the model of the machine, and the organism is the higher-order construction which holds the organs together, giving them a unified, regularized form (they twice use the phrase 'the organization of organs we call the organism'). The organism, then, is not some 'vital impulse', but a process which holds together the otherwise disjointed, scattered collection of organs/machines. Of course, other higher-order machines are also able to impose forms on the lower-order machines out of which they are constituted, but 'organism' names a specific kind of organization, one which is self-regulating. (Smith 2018, p. 103)

It is in this sense that I say the city becomes an organism, a body that is centralized, hierarchized, self-directed and self-regulating. There is a further need to distinguish between 'organism' and 'machine'. For Deleuze and Guattari, the machine is universal as 'everything is a machine' (Deleuze and Guattari, 2009, p. 2), while organisms are a specific kind of machine, which impose certain unified, (self-)regularized forms on their organs. To put it differently, the machine is the general way of put things together without any restriction, whereas the organism refers to a restrictive structure. Although it seems that machines are also self-directed and self-regulated (especially when we take humans as a part of machines), they do not operate around some principle or purpose and the connection, conjunction and disjunction of their component parts is contingent and keeps changing rather than organized in a certain way. As such a machine is capable of producing events, while an organism always attempts to keep everything at 'the statistically normal' and 'relegating everything that falls beyond this range to the register of the "pathological"' (Smith 2018, p. 107).

One of the major objectives of smart city, for example, in the projects of City Brain, is to enable a city itself to sense and solve all kinds of problems in urban management, such as traffic congestion, a fissure

[41] National Information Centre of China 2020, *All-optical Smart City Whitepaper*, p. 11-12, in Chinese. Here 'optical' refers to optical fibre broadband network.

on a bridge or a high-risk area in terms of crime rates or a pandemic. It is just like what will happen when we feel some part of our body is not right and the body tries to cure itself. This tendency to take a city as a living being is even more obvious in the projects of 'city health examination' which has been becoming an important part of urban management in China. The *Notice on Carrying out the City Health Examination in 2022*, published by the Ministry of Housing and Urban-Rural Development of China, defines the city health examination as 'a basic job to optimize urban development goals, make up for the shortcomings in urban construction, and solve the problem of "urban diseases" by comprehensively evaluating the status of urban development and construction [through collecting, analysing, and comparing against the pregiven standards various kinds of data including statistical data, data of various departments and industries, Internet big data, remote sensing data, specific survey data] and formulating targeted countermeasures'.[42] In this case, a city is treated as a patient with various potential illnesses waiting for examination and treatment. Under this thinking of problem identifying and solving, a series of problems or 'urban diseases' are presupposed and predefined (Grove et al., 2019, p. 6) and accordingly, a series of (health) indexes to measure these problems are pregiven. Despite their different assumptions about the agency of the city (autonomous or heteronomous), both the projects of City Brain and city health examination understand it as an organism which has a normal or optimal state and needs to go back to normal whenever 'getting ill'. However, this restricts the capacities of its organs and the city as a whole and prevents them from producing something new or different.

Above all, the visualization and construction of a city as an organism is undertaken with the aim of making it a self-regulated and self-directed body, organizing it into a unity and making the processes and activities thereof predictable, controllable, and optimizable. In order to free the smart city from the structure of the organism, we need to rethink the relationship between the city and the body by means of the conception of Deleuze and Guattari of the 'body without organs', which does not represent "a body deprived of organs", as the term seems to indicate, but rather ''an assemblage of organs freed from the supposedly 'natural' or 'instinctual' organization that makes it an organism'" (Smith 2018, p. 106). Still, here we are not discussing about human bodies but the body of the city, of which human bodies are a component. The above conception of the smart city as a body in the *All-optical Smart City Whitepaper* just describes the structure of smart city as a technique but does not discuss the body of the city as a larger assemblage and ignores those non-informational infrastructures, humans and other nonhuman agents, and the space, which are also important organs of a smart city.

The bad taxonomy of some smart city protagonists (for example, they sometimes take 5G as one of the features, sometimes as part of the trunk) also indicates that the one-to-one mapping between the organs of the city and those of the human body is neither meaningful nor useful. To think the city as the 'body

[42] Ministry of Housing and Urban-Rural Development of China 2022, *Notice on Carrying out the City Health Examination in 2022*, 4 July, accessed 15 August 2022, <http://www.gov.cn/zhengce/zhengceku/2022-07/09/content_5700178.htm>.

without organs' is, in contrast, to free the organs, informational or non-informational, human or nonhuman, and the body from the institutional, spatial and political settings that restrict their capacity to produce something new and from the attempts to make them into an organized, hierarchized unity. As Smith explains,

> The body without organs is the full set of capacities or potentialities of a body prior to its being given the structure of an organism, which only limits and constrains what it can. (Smith, 2018, p. 107)

Without either predefining the roles and functions of all kinds of infrastructures and agents or solidifying the connection or disconnection between them, we could allow the free combination and coordination of different organs/machines and thus the production of events, of something new within the city body, without abandoning its 'organic' properties such as sensing, judging and thinking. This is possible because a city is first of all a machine before it becomes an organism and a machine, as suggested by Deleuze and Guattari (1987), always faces two sides:

> One side of a machinic assemblage faces the strata, which doubtless make it a kind of organism, or signifying totality, or determination attributable to a subject; it also has a side facing a body without organs, which is continually dismantling the organism, causing asignifying particles or pure intensities to pass or circulate, and attributing to itself subjects that it leaves with nothing more than a name as the trace of an intensity. (p. 4)

We need to bring back the city from the field of organisms to that of machines. Why? Because, in so doing, we could conceive different versions of (non-)smart city other than the ones which people might believe actualize Deleuzian 'societies of control' (Deleuze, 1992).

Section 2.3 A Society of Digital Control

Ubiquitous and continuous control

With ubiquitous datafying, digitalizing, and computing, this idea that we are already in, or at least heading towards, what Gilles Deleuze terms the 'societies of control' (Deleuze, 1992) becomes increasingly attractive in the big data era. Evans and Kitchin (2018, p. 46), for example, argue that

> Big data systems greatly intensify the extent and frequency of monitoring of labour and shifts the governmental logic from surveillance and discipline to capture and control through the use of systems that are distributed, ubiquitous and increasingly automated, automatic and autonomous in nature. That is, there is a shift from Foucault's notion of disciplinary technologies to Deleuze's concept of technologies of control.

For them, the ubiquity and automaticity of big data techniques provides the technical foundation for continuous capture and control, which is characteristic of Deleuzian societies of control. Under the systems of big data, not only within enclosed workplaces but dispersed throughout society, each behaviour and movement of each individual could be monitored and controlled; however, these systems

shall not be identified with what Michel Foucoult (1995, p. 200) would characterize through the model of the 'panopticon', an institutional building with the form of a central watchtower placed within a circle of cells, as the latter requires the awareness of the subjects of their being watched and of the mould their behaviour is expected to fit (Savat, 2012, p. 23). The power of big data lies not only in its ubiquity and automaticity, but also its invisibility — although it is everywhere in our daily life, we are largely unaware of its existence and influence.

This invisibility/awareness, to a large extent, results from the fact that big data does not initiate discipline or self-discipline so that individuals 'actively manag[e] their behaviour to comply with expectations for fear of being caught transgressing and experiencing sanctions' (Evans and Kitchin, 2018, p. 47, citing Foucault, 1979); rather, it shapes and changes our behaviour before we are conscious of it. As a traditional Chinese poem says, 'the rain in the Spring moisturizes everything quietly'. This process is called 'modulation' or 'control' by Deleuze (1992), which presents a very different logic from what Foucault understands as discipline. Krivý (2018) explains that control/modulation is 'exerted by inducing action rather than restricting it, or, more precisely, by "curating" a networked terrain within which action is nurtured' (p. 19). '[A] disciplinary society was what we no longer were, what we had ceased to be', Deleuze (1992, p. 3) remarks. In what follows I am going to further discuss this shift from Foucaultian disciplinary societies to Deleuzian societies of control in the context of the big data era.

According to Deleuze, disciplinary societies work on the operation of enclosure: 'The individual never ceases passing from one closed environment to another, each having its own laws' – for example, the family, the school, the barracks, the factory, the hospital, the prison, and so on (Deleuze, 1992, p. 3). In the societies of control, on the other hand, the enclosure of all environments disappears, and the forces of control can flow freely across them. Thus, the forces of control are first of all liberating — they destroy the barriers between enclosed environments and free individuals from enclosure. This can be clearly shown in the example of the Health Code during the Covid-19 outbreak — with the implementation of the Health Code system after a long period of lockdown, people were allowed to travel within or across cities if their Health Code were green, instead of having to quarantine themselves as in the early stage of the pandemic. Technologies of control like big data are spatial machines in that they modulate the closeness/openness of the space and other socio-spatial relationships. They smoothen the folds on the space created by enclosure, although it is by breaking the boundaries between confined spaces or institutions that they could exert control over the whole sphere so that 'the confinement never ends' (Catlaw, 2007, p. 167). In any case, by replacing discipline, control at the beginning endows individuals with more freedom and power. Deleuze himself identifies control with modulation, the conception of the latter, and thus that of the former, already carries the premise of a certain degree of freedom.

In addition to that from confinement, the freedom brought by digital control could include that which takes away some responsibilities and burdens from us, such as the responsibility of making decisions. Take again the recommendation mechanisms of short video platforms for example. The recommendation by big data saves us from the anxiety of searching, browsing, and choosing between a massive number of videos of different types and contents, which could sometimes drown us, to find the videos we would like to watch. With the ever-growing amount of goods, services, and information available for us, making decisions or choices is becoming more and more difficult and even painful. To avoid the dilemma of the undecidable, we could simply accept what the algorithms recommend and present to us — 'Let big data decide for us', people would say. Therefore, big data provides a technical solution for shedding our burden when we are faced with the deluge of information powerlessly.

However, I am not attempting to argue that control is a better or more acceptable regime than discipline. As Deleuze (1992, p. 4) suggests, 'it is within each of them that liberating and enslaving forces confront each other'. Moreover, the rhetoric about the forces of liberating is also what technologies of control use to justify themselves. For instance, it is common for online shopping platforms to say that they can provide better goods and services through the collection of customers' data. Nonetheless, it is the freedom — ranging from convenience to empowerment — technologies (claim to) provide that makes it hard, if not almost impossible, to escape from their regimes of control.

The continuity of control is not only spatial but also temporal: While discipline takes and lasts for a long time, '[c]ontrol is short-term and of rapid rates of turnovers, but also continuous and without limits' (Deleuze, 1992, p. 6). There is not a moment when one could escape from the regimes or technologies of control. In terms of big data, for example, even when we are asleep, our smart devices can collect information from us (e.g., heart rates, snores, body movements) to infer how well we are sleeping. This temporal continuity of control is the other aspect of the real-timeness of big data: Whenever we are producing data, we are being under the regimes of control. As I have discussed in the previous two sections, the real-timeness of big data represents its attempt and effort to keep up with the speed of becoming, of time itself, which only leads to the production of more data, of more excess of data, and thus the increasing need to develop more digital or non-digital technologies with higher efficiency to consume the excess.

In a sense, the ubiquity of big data techniques, as well as the temporal continuity of their operation as technologies of control, is a response to the paradoxical desire to both produce more and at the same time, consume the excess. However, we do not reduce the societies of control to this consumption of the excess of data because if we did so, we would omit many other important implications of the concept of control itself; rather, here, I am trying to draw attention to the political economy aspect of it by relating control to the conception of a society of excess as what Georges Bataille (1998), a twentieth century French philosopher, discusses in his seminal book *The Accursed Share: An Essay on a General*

Economy, for whom the problem of the political economy of a society is not scarcity but excess which needs to be consumed or destroyed even in an irrational or crazy way. Indeed, data has become a kind of wealth. In the *Opinions on Building a More Developed System and Mechanism for Market-based Allocation of Factors* published in 2020, the Chinese government has listed data as one of the major factors of production, with land, labour, capital, and technology.[43] With data increasingly becoming a kind of wealth or a key factor of production, the connection between control and the political economy of data should not be ignored.

After decades of informatization and digitalization, a gigantic number of data has been accumulated and becomes an excess of wealth that is beyond our capacity to manage. We have to consume, appropriate or destroy the excess, as Bataille would argue. Hence the development of data technologies and sciences. To continuous generation of data, we respond with continuous utilization and 'consumption' of data through various kinds of big data techniques, which undertake both the jobs of producing and utilizing data. The tricky part is that data cannot really be consumed, and although they can be deleted, in a big data era, their speed of growth is increasingly out of control, and they gradually become a deluge that floods over our heads, yet we would still desire more. What can be consumed are the subjectivities produced by big data. Thus, I argue, big data as a technology of control is designed to appropriate and 'consume' the excess of data by the endless, iterated production and decomposition of subjectivity (Lazzarato, 2014). This does not mean the society of control only occurs as a response to or consequence of the development of big data. Rather, I am suggesting that in the big data era, control qua 'universal modulation' (Deleuze, 1992, p. 7) takes the form of the ubiquitous, continuous production of data and subjectivity.

The spatial and temporal continuity of control is a simple fact that maybe I should not have used so many words to describe, but it does depict a frustrated picture of a society of digital control which there seems to be no means for us to escape from or fight against. Moreover, the reason why I emphasize the spatial and temporal continuity is that it is the very condition based on which control qua modulation – I term it 'modulative control' – can take place. As Deleuze puts it, disciplines 'are molds, distinct castings, but controls are a modulation, like a self-deforming cast that will continuously change from one moment to the other, or like a sieve whose mesh will transmute from point to point' (1992, p. 4). Continuity is exactly what distinguishes modulation from mold and control from discipline as 'a modulator is a continuous temporal mold' (Deleuze, 1993, p. 21). Moreover, Deleuze suggests that temporal modulation implies 'a continuous variation of matter as a continuous development of form' (Deleuze, 1993, p. 21). In this sense, we could argue that modulative control appropriates the process of becoming — it is a governance mode based on the ontological understanding of being as (modulated)

[43] The Central Committee of the Communist Party of China and the State Council of the People's Republic of China 2020, *Opinions on Building a More Developed System and Mechanism for Market-based Allocation of Factors*, 9 April, accessed 16 August 2022, in Chinese, < http://www.gov.cn/zhengce/2020-04/09/content_5500622.htm >.

becoming (Hui, 2015, p. 79). To understand its political consequences especially in the context of a big data era, we need to further discuss the liberating and enslaving aspects of control as continuous modulation.

Control, self-regulation, and cybernetics

Despite 'the premise of "free" subject', the conception of control qua modulation is often understood in relation to self-regulation so that 'such freedom is already anticipated by regulatory systems, and the free acts themselves are modulated in such a way that they take on a self-regulatory character' (Hui, 2015, p. 83). More specifically, in the context of big data, we could observe that the freedom traditionally attributed to subjects is increasingly determined by algorithms. However, I would argue against this normative understanding of modulative control as self-regulation or self-discipline: For one thing, as I have discussed in the beginning of this section, modulation shapes people's behavior more implicitly than explicitly, more unconsciously than consciously; for another, following Lazzarato and Deleuze and Guattari, modulation does not act on individuals but 'dividuals' and the individual, as well as the care for the individual, dissipates in the flux of codes and data (Savat, 2012, p. 56). I argue that in spite of its enslaving or regulatory aspect, the modulatory mode of control should not be identified with self-regulation.

To further discuss this problem, I now turn to the relationships between modulative control, self-regulation, and cybernetics, as cybernetics is a research programme to understand the mechanisms of self-regulation in various systems (Williams, 2015, p. 213) and often understood as a diagram for the societies of control. From the perspective of cybernetics, a system is self-regulating or self-balancing: The system will go back to a normal or optimal state (i.e., an equilibrium) whenever deviating. Such goal-oriented processes or functions to main the pregiven equilibrium or equilibria are referred to as 'control' in cybernetic theories. A cybernetic reading of control limits it to 'one based on flexibly applied *constriction* through negative feedback, in the sense of controlling individuals and collectives through the installation of homeostatic regulative dynamics'. Accordingly, the societies of control are understood as social systems with 'complex networks of negative feedback-driven homeostats' (Williams, 2015, p. 210-5, emphasis in original).

However, this understanding of control and the control society does not merely overlook the constructive or liberating aspect of control, that is to say, 'the ways in which control systems positively construct as well as negatively constrict action', their capacities of 'mak[ing] things possible that would otherwise be impossible' (Williams, 2015, p. 218). but misconstrues the nature of control and its apparatuses, in relation to its original sense given by Deleuze. First of all, control is not a force of normalizing or (self-)regulating. There are no pre-set norms or target states in a regime of control, as control/modulation initiates continuous variation without direction or telos. If we interpret modulation

or control as cybernetic self-regulation, we will be still confusing modulation with molding, which is exactly what Deleuze would be against.

To save the concept of modulation from its relatedness to (self-)regulation, Hui (2015) presents and compares two different understandings of it:

> on the one hand, the understanding of modulation as a technological mechanism whose constitutive processes are analogous to emergent models of social control; on the other hand, the theory of ontogenesis based on the idea of modulation, which understand the latter as the principle of being qua becoming. (p. 86)

This distinguishes modulation from control and considers 'control societies as specific modes of modulation' (Hui, 2015, p. 77). For Hui, the concept of control is more negative while modulation could both constructive and restrictive aspects. Although it provides an insightful understanding of the concept of modulation, as far as I am concerned, this distinguishing between control and modulation is not necessary. We do not need to understand 'control' literally, correlating it with regulation and social control. Instead, I suggest, we could separate control from its seemingly regulatory regimes and take control simply as modulation in the second sense given by Hui. The reason for this is to avoid the cybernetic reading of both control and modulation and to neutralize the concept of control: Control aims not to produce individuated subjects or stationary systems, but functions to appropriate 'being qua becoming'.

Secondly, we should not understand regimes of control in the framework of the system because a system is a relatively closed unity with certain boundaries, while there is no boundary for control. The control society is not made up of self-regulated systems but rather of machines. In this sense, control amounts to machinic enslavement. That is to say, control is the way a machine puts together its components in conjunction or disjunction with each other. Lazzarato (2014) illustrates that '[e]nslavement is a concept that Deleuze and Guattarri borrowed explicitly from cybernetics and the science of automation', which refers to 'the "management" or "government" of the components of a system' (p. 25). This said, the framework of the bordered, self-regulated system is what we should abandon via the conception of machine and machinic enslavement. A machine is not a bordered or closed system; becoming a part of a machine does not imply that we are 'trapped' in a system. We can always 'move' in and out of a machine; that is, becoming and not becoming a part of it. The problem is that we are always in a machine or machines — when we jump out from one machine, we would without doubt fall into another.

The moving between and being enslaved by different machines, of both humans and nonhuman agents, is characteristic of the society of control. As I have discussed in Section 2.2, the concept of 'machine' I use here is larger than that of technical machines. In the broadest sense, a machine is a set of elements connecting and disconnecting with each other. Connecting and disconnecting are not two states but processes which always change, and it is in the variation of the connection, conjunction and disjunction

of elements that modulation happens. As Krivý (2018, p. 19) puts it, the control society builds on 'networked terrains' connecting and modulating 'dividuals'. The networked terrains are not systems but machines. It is through machinic enslavement that control is possible. Therefore, I argue that societies of control are societies of machines.

Above all, cybernetics, which understands systems in relation to homoeostatic processes, fails to explain the nature of control which concerns itself with neither homoeostasis nor systems. It fits better with the socio-technical realities of disciplinary societies rather than societies of control. Compared with the first order cybernetics we discussed above, second order cybernetics might provide a better understanding of control as it highlights the problems of positive feedback, chaos and complexity (Krivý, 2018, p. 16). The difference between positive feedback and negative feedback is that while the latter mitigates a given process to sustain the homeostasis of a system, the former operates to reinforce the process and thus increases the complexity and unpredictability of the system (Williams, 2015, p. 214).

Because of its incorporating of complexity and unpredictability, many view second order cybernetics as 'liberating, emancipatory and politically progressive' (Krivý, 2018, p. 17). However, Krivý argues, 'the very notions of contingency, complexity and unpredictability have become instruments of control within intellectual and governance models informed by second-order cybernetics' (Krivý, 2018, p. 17). The existence of complexity legitimizes the need for control: In response to the ever-increasing complexity and unpredictability of the systems, there shall be 'perpetual adaptation, optimization and control'; yet instead of eliminating or decreasing the complexity and unpredictability, a system should make use of them. As such, in second order cybernetics, control is understood as a regime in which 'power relations reproduce through proliferating indeterminacy, nonlinearity and complexity, rather than by curbing these into determinate, linear and unidirectional forms' (Krivý, 2018, p. 18).

Moreover, from the perspective of second order cybernetics, a system is understood as a 'horizontal self-organising network' (Krivý, 2018, p .19) or more specifically, as

> a machine organized . . . as a network of processes of production (transformation and destruction) of components which: (i) through their interaction and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in space in which they (the components) exist by specifying the topological realization of such a network. (Maturana and Varela, 2012, p. 78)

In this case, the concept of 'system' and that of 'machine' coincide with each other, and this definition of systems/machines as autopoietic networks is similar to what we have discussed in Section 2.2. However, this definition still maintains the boundedness and closedness of the system and, more importantly, it implies that 'the internal construction and networking of a machine, organism, or system reproduces itself in novel iterations as a response to — and through interaction with — the outside

environment' (Clough et al., 2018, p. 101-2). But, as Clough et al. (2018, p. 102) argues, this is equivalent to saying that the system is 'totally enclosed and detached' from the outside. Therefore, the second-order cybernetic interpretation of the system is not the same with what we have understood as machines so far.

For me, the machine without the boundary or the outside is a key concept to inquire into the operating of control and the control society. I argue that the societies of control are topological arrangements of such socio-technical machines. In addition, if we return to the above discussion of the relationship between complexity and control, I argue that positive feedback and adaptation would be insufficient to explain the nature of control/modulation. For control is not a process responding or adapting to something such as complexity and indeterminacy. Rather than appropriating complexity, it generates complexity, or it might not even concern about complexity — control is itself the complex, the indeterminate and contingent. Simply put, we could not know where control/modulation as a continual movement with no direction or telos would lead a machine to, what it would make possible or impossible. Therefore, second-order cybernetics might not adequately explain the nature of (post-cybernetic) control and modulation either.

This is why new technologies associated with big data, and the digital modes of control they enact, cannot be understood in terms of cybernetic systems. These technologies do not work within and on closed systems, but rather create unbounded spaces for control, which I will further illustrate in Chapter IV especially through the case study of the Health Code. I note from Chinese social media that people often say that we are 'trapped' in and by various systems (i.e., the companies we work at or an online platform we use), such as in the example of food delivery drivers, when they talk about the condition of being and living in modern society. But I argue we are not in systems but machines whenever we engage with digital technologies such as big data. A machine is never a closed, bounded unity, and we are never really trapped in a machine. We become part of a machine (machines) in one moment and of another in the next. Although these machines could sometimes appear to be cybernetic – for example, the faster a delivery driver finishes her previous orders, the shorter time the platform gives to her next ones, the control of them could be more freedom and directionless as it concerns less about individuated subjects than 'dividuals', less about 'molds, distinct castings' than modulation, 'a self-deforming cast that will continuously change from one moment to the other, or like a sieve whose mesh will transmute from point to point' (Deleuze, 1992, p. 4). It is not a question of negative or positive feedback, but of the fact that we are always living within and between different socio-technical machines wherein digital technologies initiate universal, continuous modulation with neither ending nor predictable direction.

Digital modes of control and noopolitics

After a detour of investigating the relationship between cybernetics and societies of control, we should go back to a more direct discussion of control in the context of big data, which I call 'data control'. The most obvious characteristics of control in the big data era is that it is enabled by data, algorithms, codes, protocols, and platforms.[44] Yet individuals are not only controlled through data but also as data. Deleuze (1992) claims that the 'numerical language of control is made of codes that mark access to information, or reject it' (p. 5). Here the 'codes' he refers to are passwords rather than computer programs. There are two implications here that I would like to draw out. On the one hand, code implies the dis-individuation of subjects since, for Deleuze, unlike the two poles of disciplinary power, the signature and the number, the former of which identifies the individual while the latter his or her position within a mass, the code does not deal with the individual/mass pair by 'mold[ing] the individuality of each member' and at the same time, integrating them into a united body (Deleuze, 1992, p .5), such as the People; instead, it turns individuals into 'dividuals'. Now this role of the code has been overtaken by data. Techniques related to big data, as I have discussed in Section 2.1, do not only provide technical instruments for control, but also illustrate and respond to this onto-political shift.

On the other hand, codes, as passwords, do not only manage the access to information, resources, power, and certain areas, but also represent a mechanism of control which modulates 'the *position* of any element within an open environment at any given constant' (Deleuze, 1992, p. 7, emphasis mine). We could understand this modulation of 'position' literally, as in the case of the Health Code which controls the movement of people during the Covid-19, but we could also interpret it socially, economically or politically: The mechanisms of control work through the modulation of the socio-spatial positions of elements constituting networked terrains which are open to each other. In other words, modulation is always the modulation of positions, of spatial relations (i.e., the connection, conjunction and disjunction between elements), based on which the modulation of perception, affection, desire and behavior could happen.

We can see that this modulation of socio-spatial relations increasingly relies on big data in order to function. As shown in the development of smart city, big data changes our interaction with urban environments, which is becoming more and more digitally assisted. But the most important influence of big data, I argue, is its control of the information or media content we can receive or have access to and its participation in the production and dissemination of knowledge and discourse. With the development of computing social sciences, as well as the employment of big data in business and government decision-making, big data has become an important way for producing knowledge and discourse. On the other hand, to an increasing extent, big data determines what kind of information, discourse and knowledge will be known and accepted by people, which can be done simply through the recommendation mechanisms of social media platforms as more and more people gain information

[44] I think platforms are the best representation of what we have understood as machines in the general sense.

mainly from these platforms. Big data distributes different degrees of attention and power to different discourses. In this case, the power of discourse refers to the extent to which it draws attention of the public and influences public opinion and thus cultivates social action.

Although this has been discussed in Section 2.1, here I highlight the political consequences, especially in terms of the control of public opinion as Krivý (2018) argues, 'in society of control, power sustains itself by modulating and differentiating attentions, desires and opinions rather than modulating bodies into homogeneous forms' (p. 19). Meanwhile, he further suggests, social action also becomes communicative, which concerns less about collective decision-making than the adjustment of public opinion by 'capturing attention, raising awareness, inciting feelings of desire and guilt, nudging towards a different lifestyle and changing behaviour' (Krivý 2018, p. 20). The Internet witnesses a lot of examples when an event raises a lot of attention and complaints, say, about government's inaction, which develop into public voice urging governments to make changes. It is easy to see how big data could intervene in this process: The more a news report has been read, the higher chance it will be recommended by the algorithm to more people. At the same time, there are maybe other events which are more or equally important but get ignored and forgotten by the Internet. The problem is in the big data era the public has no idea which event could draw enough attention and whose voice would be heard or unheard. In other words, there is ambiguity in the conditioning of algorithms on attention. Social media platforms, as well as other related industries, could use algorithms to modulate it towards a certain direction particularly in targeted marketing, but at the same time, the continuous delivery of information could also shift users' attention constantly and make them focus on nothing in the end. In either case, how big data conditions attention is out of the purview of the users.

On the other hand, the phenomenon of what Sunstein (2006) terms 'information cocoons', that people only care about certain kinds of information and show no interest to others, seems to be more and more common with the popularization of personalized information recommendation systems. It does not only result in narrow-mindedness and prejudice, but also the growing difference and divergence of opinions to the extent that the communication between different people and the development of public opinion seem to become more and more difficult. Therefore, we particularly require a re-examination of the politics of public opinion or what Lazzarato (2006) terms *noopolitics*, that is the politics of 'the incorporeal dimension of bodies' (p. 185).

I understand the phenomenon of 'information cocoons' in relation to both Lazzarato's discussion on the production of subjectivity and *noopolitics*. As discussed in the beginning of this chapter, personalisation, say, on social media, at first glance, is a process of social subjection, which provides different information to different people according to their preferences or identities. However, it does not only work on the individuated subjects but 'through the modulation of flows of desires and beliefs and through the forces (memory and attention) that make these flows circulate in the cooperation between

brains', the latter of which is central to Lazzarato's *noopolitics* (Lazzarato, 2006, p. 185). That is to say, in personalisation, as the modulation of attention, memory, desires and beliefs, it is always a question of the (incorporeal) component parts of subjectivity and of machinic enslavement in which these components become crucial for the operation of social media platforms. Moreover, following Lazzarato, I argue that personalisation also influences 'the cooperation between brains', in particular the development of public opinion and public attention. These will be discussed in detail in Chapter V, in which I argue that the influence of big data on the production and dissemination of information and public opinion should be understood in relation to not merely positive or negative feedback, but rather modulation or the combination of different regimes. As social media platforms often claim, randomness is an important part of their recommendation algorithm.[45] We never know where and what big data will lead us to.

So far, I have been insisting on understanding control as modulation and modulation as the appropriation of being qua becoming. It is difficult not to correlate control with regulation, supervision and social control. However, I suggest that we should relate the concept of control to that of the machine, which for Deleuze does not have purposes or predictable movements but instead produces events. From this perspective, control should not be simply interpreted as normalizing and regularizing processes or forces which are much more intensified than those of discipline and so intensified that they make control a totally different regime from the latter. Rather, control is the modulation of the flows of elements connecting and disconnecting with each other and constituting open terrains or networks and this modulation has no inherent direction or purpose. Desire, beliefs, behaviour, and events are curated in this process. The reason why control always seems to be regulatory is that it is impossible to empirically distinguish control from other regimes or forces.

Evan and Kitchin (2018) observe that regimes of control are 'open to vertical and horizontal fissures' and when control fails, disciplinary regimes will be employed (p. 44). Is it not because technology of control and disciplinary technology always accompany with each other that we cannot separate one from another? Although I focus on big data as a technology of control, the governance mode under big data is not limited to control; but it is already different from what the societies had before. On the other hand, by neutralizing the concept of 'control', I am not arguing for societies of control and against disciplinary societies; instead, I am looking for the space from where we can fight against ubiquitous, continuous modulation and control within the regime of control itself. In terms of big data, we do not have to accept what the algorithm selects for us. Modulation is not one-way — we could change how big data defines and profiles us just as it could nudge our behavior. This requires us to judge, to choose, to make decisions and to explore the possibilities beyond what big data presents to us, but first of all

[45] 36 Kr 2018, 'Suhua of Kuaishou: Values are needed behind the algorithm, we can say no to the information cocoons', 8 November, accessed 19 August 2022, < https://lmtw.com/mzw/content/detail/id/163657>.

requires us to rethink how big data techniques expand and restrict our possibilities.

In this chapter, I discuss what big data does and how it works, as well as how it changes the ways of being and living in the city, and reshapes the urban environments and urban management, through the perspective of the production of subjectivity, the Deleuze-Guattarian conception of the machine and the organism, and the society of control. I think the key issue is the relations between the humans, digital technologies (associated with big data), and cities, in terms of how people's behaviour and movement produce and are conditioned by data and how both human and nonhuman agents (including but not limited to digital devices and data) constitute the component parts of different data machines as 'dividuals', which in turn influence the operation of the cities and people's engagement with them. To further de-fetishize big data, in the next chapter, I am going to investigate the technicity of big data, which concerns both the question of what constitutes big data as a technology and the relationship between the humans and big data technology. These two chapters together constitute my discussion of such relationship, but while Chapter II focuses on the power relations within this relationship, Chapter III concerns more the phenomenological understandings of it. Moreover, in the next chapter, I am going to discuss the problem of technical unconsciousness in the context of the digitalizing society of China, which I think is crucial to the rethinking of different relationship between the humans and digital technologies.

Chapter III. Technicity of Big Data

Section 3.1 Big Data as Mnemotechnics

Big data and the exteriorisation of memory

In the previous chapter, I discussed the operating mode of big data – by participating in the production of subjectivity and initiating continuous digital control – and introduced its role in the mechanization (becoming-machine) and vitalization (becoming-organism) of urban space, drawing upon Lazzarato's discussion of the production of subjectivity, Deleuze and Guattari's conception of the machine and the organism, and Deleuze's discussion of the society of control. Their work does not only provide important insights for the politics of big data and smart urbanism but also for the relationship between the humans and digital technologies and devices in which, on the one hand, digital technologies influence and mediate people's everyday life and on the other, they become interchangeable parts of different socio-techno-datalogical machines. I now want to further de-fetishize big data by analysing the technicity of it and, more specifically, the problem of technical unconsciousness in the big data era. Technicity is not only the qualities which constitutes a technology as technology but also, as Kinsley (2014, p. 371) drawing on Bernard Stiegler puts it, 'the problematic and constitutive relation' between the human and technology. In the three sections of this chapter, I characterise big data respectively as 'mnemotechnics', 'real-time technology', and 'cosmotechnology', finding resources in the work of Stiegler and Yuk Hui, who is a student of Stiegler and whose work I cite here (Hui, 2016b, 2017) is influenced by him and Martin Heidegger. Here I take up a phenomenological perspective to further the understanding of big data as a technology and of the relationship between the human and big data technology.

In this section, drawing inspiration from the work of Stiegler, I argue that big data extends and exteriorizes the memory of the humans more intensively than any other technologies so that forgetting and being forgotten becomes increasingly difficult (if not impossible) yet necessary. In this case, a key problematic when it comes to big data is the need to ask and rethink what 'forgetting' means in this era. To give a sense of why this is important, I present a story about my own engagement with short video platforms:

During the Chinese New Year of 2020, because of the outbreak of Covid-19, I stayed at home for weeks, barely stepping out of the house. I had nothing to do, so I decided to watch Douyin (i.e., Chinese version of TikTok) and Kuaishou, two major short video media platforms/apps in China, not only because I was boring but I would like to know more about this kind of platforms and how they work. I had used Douyin and Kuaishou before, but they

did never attract me. Yet this time, I became addicted to Douyin and Kuaishou very quickly, spending all day watching videos on them without knowing time really flew, until I found that they kept recommending me videos of similar content or the same type, which was boring and even annoying.

In addition, when I was watching Douyin and Kuaishou, I gradually realized that I was interested in watching videos about family mediation and dispute resolution after the apps recommended me this kind of videos on multiple occasions, which was to my own surprise. These videos were clips from television shows in which the host would invite family members having problems with each other and encourage them to open up to communicate with or complain about each other and at the same time, experts would provide advice to fix their relationship. After some reflection, I knew that I liked videos about food, movies and travel, but I had no idea that I would like this type of TV show.

Actually, it did take a while for me to realize this fact even though the clue was clear — these videos appeared on my watching list again and again. I was reminded that when I was in middle school, my mother liked this kind of TV show a lot and my family always watched them together during or after dinner. However, I had not watched these TV shows since high school and almost forgot about them. Yet it seems that big data knows about me even better than myself, not only in terms of my present, but also my past and my memory.

These platforms record each action and choice of users in real time whenever we are using them, such as whether we 'Like' or are 'Not Interested' in a video, what we comment on it, and who we follow. Not limited to these platforms or the smart devices on which they are built, big data techniques and devices around us everywhere prompt us to memorize anything, whether important or unimportant, especially what we might easily forget. The technicity of big data is such that it (re-)presents the memory to us again and again whenever necessary, often reminding us of past experiences which have been or should be forgotten.

Big data exteriorises memory in an automatic, continuous, and intense way since the ubiquitous, continuous process of data collection is also the process of continuous memorizing. This exteriorised memory could be understood as what Stiegler terms 'tertiary retention', a concept that he adds to Husserl's primary and secondary retention (Husserl, 2012). Yuk Hui describes Stiegler's concept of tertiary retention in the following way:

When we listen to a melody, what is retained immediately in memory is the primary retention; if tomorrow I recall the melody, this testifies to a secondary retention. What Stiegler calls tertiary retention, then, would be, for example, the musical score, the gramophone, or any other recording device that externalises the melody in a stable and enduring form outside of consciousness proper. (Hui, 2016b, p. 215)

As the musical score externalises the melody, big data retains outside of the mind the behaviours, actions and events of the past and the present, which are not only data but memories. This exteriorisation of memory is a starting point for us to investigate the technicity of big data since, as Hui (2016b) puts it, 'technics can be understood as the extension of the body or the exteriorisation of memory' (p. 9).

However, the exteriorisation of memory does not simply mean the preservation or storage of individuals' memory in technical objects or the recording of what happened in the past. For Stiegler, the exteriorised memory, or tertiary retention, is 'epiphylogenetic memory', which is a 'past that I never lived but that is nevertheless my past, without which I would never have had a past of my own' (Stiegler, 1998, p. 140). Here Stiegler distinguishes between another three kinds of memories: genetic memory, epigenetic

memory (‘memory of the central nervous system’), epiphylogenetic memory (‘techno-logical memory’) (Stiegler, 1998, p. 177). Their differences could be summarized as follows:

> genetic memory is our ‘biological programming’, epigenetic memory is formed by our personal experiences, whether conscious, unconscious or bodily, and epiphylogenetic memory is the impersonal collective memory that is contained in technical subjects. (Lindberg, 2020, p. 389, citing Stiegler 1994)

Therefore, Stiegler’s notion of epiphylogenetic memory is ‘a form of social memory’, of the exteriorised memory passed from generation to generation (Hui, 2017, p. 311), which is different from what we usually understand as the exteriorisation of personal memory, or what Stiegler refers to as ‘epigenetic memory’.

It is in this sense of social memory that Stiegler suggests that epiphylogenetic memory refers to a ‘past that I never lived but that is nevertheless my past’. Although we have never lived this past by ourselves, it nonetheless conditions our everyday life as an unconscious part (Hui, 2016b, p. 234). Heidegger calls this past the ‘already-there’, while Stiegler, influenced by and at the same time differing from him, shows the technical dimensions of the ‘already-there’ through the conception of tertiary retention, and highlights the role of technics in the temporalization of being, without which ‘the temporalization of the past, present and future’ could not be possible (Hui, 2016b, p. 231). As Stiegler notes,

> if it is true that only epigenetic sedimentation can be the already-there, this is only possible when the transmission allowing for the sediments is of an absolutely technical, nonliving essence (Stiegler, 1998, p. 140)

For Stiegler, it is technologies qua tertiary retention that constitute the ‘already-there’ or what Heidegger otherwise calls the historical, which Heidegger himself largely ignores (Hui, 2016a, p. 147, Hui, 2016b, p. 266, Stiegler, 1998, p. 140-1).

Following Stiegler, Hui (2017) further distinguishes three ‘syntheses of social memory’ – ‘the exteriorization of memory by means of tools, rules, and rituals’, ‘the construction of explicit historical memories’, and ‘the anamnesis of the unmemorable’ – which he argues are all conditioned by technics (p. 312). The first is what we have considered so far, which is implied and contained in ‘the invention and use of technical objects’, without being explicitly expressed, while the second is ‘the conscious construction of memory based on historical events’ which also relies on technics such as ‘writings, monuments, archives, museums, etc’ and as Hui understands it, nowadays more and more on digital technologies such as big data (Hui, 2017, p. 309-11).

One notable example of the second synthesis of social memory is the digitalization of Notre-Dame de Paris. After the devastating fire in 2019, a 3D model of this landmark created in 2015 by Andrew Tallon, a professor at Vassar College, attracted a lot of attention and arouse a heated discussion about the

potential of digital architecture especially in property preservation and restoration.[46] What have been digitized are not only the structures but also a lot of valuable memories people do not wish to forget. Although this 3D model was created before the fire, it nevertheless bears the memory of it – whenever they visit the 3D-versioned Notre-Dame de Paris, people will remember that devastating fire as well as other historical events related to it. In other words, it is not only the preservation of the memories but the explicit (re-)construction of such memories that is at stake here. In addition to this example, the digitalization of archives such as government documents and historical literature is more common, not to mention that nowadays most archives are already produced in digital forms.

For Hui, digital technologies diminish 'the distance between the first and the second synthesis'. Yet this is not a new phenomenon since writing is already such kind of technics which integrates the first synthesis with the second. The process of writing implies the knowledge about it passed from generation to generation, which we utilize but are not necessarily conscious of, while the content written is the conscious construction of the past, of the memory. It is actually a character of all the technics on which the conscious construction of social memories relies. However, digital technologies 'have pushed it to a new stage' as all traces produced in the use of them become the second synthesis (Hui, 2017, p. 315-7). Hui uses the increasing digitalization of historical archives as one of the examples to prove the diminishing distance between the first and second synthesis, which nonetheless might be inappropriate because the digitized memory of historical events and the living memory of the use of such technologies are still two different things.

I argue that the distance between the first and second synthesis could disappear only when the second is considered in terms of the construction of the memories of the use of technical objects, instead of the digitalization of other historical events. It is in this sense that I argue the second synthesis, as well as the first, is of the memories about and of technical objects themselves. The difference between these two syntheses is that the first is more like habit while the second synthesis – the construction by technical objects of their own memory – is what digital technologies such as big data highlights for the evolution of modern technicity. It is through big data that technical objects have their own memories (the second synthesis), not just mere instinct or habits (the first synthesis), and thus become so-called 'smart objects'. In a nutshell, I understand data not only as memories of the humans but also of technical objects.

Hui's reading of Stiegler is important because it highlights how tertiary retention is more than the exteriorised memory of human beings: it reveals the relationship between the memory of humans and that of technical objects, which are constitutive of each other. In other words, technical objects are the

[46] Allal-Chérif, O & Gombault, A 2019, 'Digital cathedrals: bringing Notre-Dame de Paris back to life', *The Conversation*, 24 April, accessed 22 August 2022, <https://theconversation.com/digital-cathedrals-bringing-notre-dame-de-paris-back-to-life-115867>.

exteriorisation of the memory of human beings, while the latter are also part of or internal to the memory of the former. In terms of tertiary retention, Lindberg (2020) explains that technical objects are 'exteriorised memories' because 'they contain knowledge of the world and especially of the way in which the human being can relate to it' and using the wheel as an example, suggests that what the wheel knows or remembers is 'how to produce an endless movement' (p. 389). I argue that what knowledge big data as a technique contains is exactly how to store and produce memory, not only of human beings but also of technical objects and other nonhuman agents.

One of the consequences of the integration of the first and the second syntheses is that the conscious construction of historical and social memories is replaced by the automatic, continuous production of what Hui (2017) calls 'live archives' or 'living memories' in the forms of texts, images and videos, or simply just data. As Hui puts it, 'Every second, billions of images document ongoing events, attesting to a constantly ongoing and unconscious effort to create living memories out of the past' (p. 316-7). Take Facebook for example. It was estimated that in 2012 Facebook generated 2.5 billion pieces of content (posts, comments, links etc.), 2.7 billion "Likes", and 300 million photos per day.[47] This gigantic amount of content and photos constitutes not only the expressions of people's feelings or the simple recording of their lives, but also social memory as well as their personal memories. It is even more so today that social memories are woven by the small and fragmented pieces of texts, images and videos, which do not only belong to human beings but also to technical objects.

In light of the development of cinema and television, Stiegler (2001, cited in Roberts, 2006, p. 59) worries that we are witnessing a global 'industrialization of memory' and that '[t]he 20th century is the century of the industrialization, the conservation and the transmission – that is, the selection – of memory'. This technical tendency is further intensified in the big data era since the mass production of memory is no longer concentrated in culture industries but exists everywhere as it is reduced to the production and consumption of data (Hui, 2017, p. 317). In this case, digital techniques such as big data condition the production, conservation and selection of the social memory. They do not only store or externalize social memories, but also determine what kinds of memories are presented to or constructed for us and in which way. For Stiegler, the production of 'industrial temporal objects', such as films, radio and television programs, is a process of the selection of social memory which determines what to include or exclude (Roberts, 2006, p. 58-9). The development of big data, I argue, makes this process of selection further, as it does not only subject to the 'industrial standardization of the criteria of selection' (Stiegler, 2010, p. 77) but more importantly to the techno-logics of big data, such as the ways of the organization, recommendation, and presentation of information on Google Search, short video

[47] Constine, J., 2012, 'How big is Facebook's data? 2.5 billion pieces of content and 500+ terabytes ingested every day', 23 August, accessed 22 August 2022, *<https://techcrunch.com/2012/08/22/how-big-is-facebooks-data-2-5-billion-pieces-of-content-and-500-terabytes-ingested-every-day/>*.

platforms, or other social media.

This illustrates Stiegler's definition of technology as 'pharmakon', that is, as both poison and cure (Stiegler, 2012). As he puts it, 'the exteriorization of memory is [also] a loss of memory' (Stiegler, 2010b, p. 29). Technology does not only make memory easily accessible but also 'short-circuit[s] living and anamnesic memory' (Stiegler, 2010b, p. 79). Take short video platforms again for example, on which videos are not only produced, uploaded, and circulated for entertainment but also for recording events to draw attention or raise concerns. As Stiegler would argue, videos are externalized memory of the users. Moreover, the videos that go viral could explicitly become a part of collective memory. However, this construction of collective memory does not only depend on the content of these videos, or the importance of the events they narrate, but is instead more and more influenced by how algorithms present them to the audiences. For instance, there could be snowball effect in the prevalence of an event, such that the more attention it receives, the more recommendation it will get and the more attention it will attract subsequently due to the algorithms of big data. This is a dual process of short-circuiting attention and memory – as Lazzarato (2006) argues, the *conatus* of memory is attention. On the other hand, as people always say that the Internet has no memory, an event which once received a lot of attention can be forgotten quickly, as if it has never happened. In this sense, the memories of a social event seem to be produced as a disposable commodity. It is for this reason that more explicit forms of social memories such as museums seem to become more and more valuable in the big data era. But the problem is not the digitalization of historical archives or buildings since, for example, the 3D-versioned Notre Dame de Paris does provide a means for us to store the memories about it, but rather the dispersion of the social memory over ubiquitous 'live archives', which is constructed only to be consumed.

Big data and the actualization of memory

In the last section, drawing on Stiegler's conception of technology as tertiary retention and Hui's reading of him, I discuss the anamnestic nature of big data, that is its conditioning of the production, conservation and selection of social memory. However, in order to further investigate such technicity of big data, we need to return to the individual and sub-individual levels of the memory, for which I turn to Henri Bergson. Recall the story given above about my own empirical engagement with those short video platforms, which is itself a conscious construction of memory. When at the beginning the platforms recommended videos about family mediation to me, I did not realize I had watched this kind of television show before (i.e., in my middle school) and simply found these videos interesting. Then they recommended this kind of video more often and I just watched whatever they presented. However, after watching so many similar videos, I got bored and started to wonder why I would be interested in these videos and gradually remembered that I watched a similar television show when I was in middle

school.

From this process, we can easily see how big data remembered what I was interested in (when I was using Douyin or Kuaishou) and prompted me to recollect a remote memory through the mechanism of personalized/repeated recommendation. It is through the interaction between my personal memories and the memories of the platforms (i.e., big data) that the construction or actualization of this remote memory could be possible. By 'actualization', I am implying that the repeated presentation of videos with similar content did not trigger a pre-existing memory already stored in my mind, but rather that it created a milieu in which the memory could be actualized and presented to me. Because memories are not 'stored within consciousness or in the brain'; rather, they are spread over the body, the technical objects it engages with, and the environment as a whole and from the perspective of Bergson, the brain is merely 'a filtering or selection mechanism' which allows certain memories to be actualized (Al-Saji, 2004, p. 204, 230). If we say there is the exteriorisation of memory, it is because memories are inherently external to the individual mind. As discussed above, big data also works as the filtering or selection mechanism of memories, social or individual. This constitutes what Stiegler (2009) calls the 'short-circuiting' of memories.

In relation to memories, big data does two things: memorizing what we do as well as other things happening around us and selectively presenting these memories to us from time to time. The most common way of the latter is personalized recommendation and presentation of goods, news, videos, music, etc. or less explicitly, through the personalized price set by a taxi app or the Health Code. The content recommended and presented does not only attempt to match with one's preference but reveals to one a piece of their memory or past. In other words, a recommendation of a video by the YouTube algorithm, for example, is also a manifestation of one's past experience and an actualization of one's memory. Although this actualization is only closely related to a certain part of one's past, it is also a repetition in relation to the whole of their lived experience in 'an unconscious, virtual state' (Perri, 2014, p. 838). This totality of one's past experience is what Bergson (1991, p. 156) calls 'pure memory'. It is the pure memory that conditions the actualization of a single memory and in turn, the latter is a repetition of the former as a whole, despite the fact that only certain details are remembered and enter into our consciousness.

Instead of recollecting it by ourselves, big data selects, actualizes, and presents a memory to us. It seems to be merely entertainment, but our every interaction with short video platforms has been recorded and whenever we watch videos algorithmically recommended by big data, they remind us of who we were. If short video platforms, to some extent, reflect our present avatar, it is through the selection and actualisation of memories. Here, rather than that we always consciously relate them to (part of) our past, I am suggesting that memory is impersonal – as Stiegler remarks, technics does not help memory but is memory (Stiegler, 2008, pp. 65). Although these videos themselves are not memories of ours as they

might be produced and uploaded by others, they become (our) actualised memories or actualisations of memories through the recommendation mechanism. We may have not watched before a video recommended to us, but it is still a part of our past, a past we have not lived but that is nevertheless our past, because what big data presents to us, such as a video, an image, a news, or a goods, does not necessarily refer to a certain behaviour we had in the past, but to the whole of our past experience (at least the part which has been captured by big data). In a nutshell, the videos recommended and presented to us actualise the memories of our past as a whole. As introduced in the last section, this concept of a past that we have not lived is precisely what Stiegler is talking about when he refers to tertiary retention. But he focuses on the collective memory transmitted from generation to generation through technologies. However, by the same concept, I suggest that the videos recommended according to our historical data also actualise and present to us a memory of our own, not just a collective memory. Here I am referring to the virtuality of the memory of individuals which is nonetheless also conditioned by technologies such as big data, through an encounter between Stiegler and Bergson. The philosophical differences between Bergson and Stiegler on this topic of memory or the past lies in that Stiegler always understands the past as technically conditioned, while in Bergson's more metaphysical conception, the past is always 'pure'.

Above all, big data does not only exteriorise memories by storing them in data or digital devices but also presents them to us from time to time. This presentation is also the actualization of memories. Furthermore, the 'personalized production of subjectivity' (Hynes and Sharpe, 2015, p. 67) in the context of big data is based on such appropriation of memories, which intensifies the influence of the past on the present. Memories, then, are not representations of the past, but relations to the past, which ensure the continuity between the past and the present (and also the future). The functioning of big data (e.g., predicting the present or the future according to the data of the past) is based on such continuity. Without memory, there would be only the ever-changing present, and thus there would be neither identity nor subjectivity. Therefore, memory plays a dual role in the production of subjectivity – for one thing, memories are the materials for it; for another, the continuity between the past and the present sustained by the memory justifies the subjectivity produced and assigned to human beings.

Although the past always conditions the present, it is more in the form of pure memory than actualized, concrete memories/subjectivities. Yet big data keeps reminding one who he or she was in the past through the latter. The repeated recollection of certain memories that we cannot forget or give up is an illness, not of the mind but of modern digital technologies. The problem of big data is that it does not know about forgetting, and this is a problem not only in terms of privacy concerns (on these concerns see, for example, Graham and Shelton, 2013, p. 258, Tene and Polonetsky, 2011, Jain et al., 2016) but also of the personalized production of subjectivity. As Hui (2009, no page) puts it,

> Firstly, technics as tertiary memory, refers to the trace of a past which belongs to me but I never live; secondly the

content/products of technics, which constitute a past which belong[s] to me and I still have to live with.[48]

There is particularly a necessity of forgetting in the big data era when forgetting, as well as being forgotten, is difficult, if not almost impossible. It is especially in this era that we need to re-collect Nietzsche's remark that 'without forgetting, it is quite impossible to live at all' (Nietzsche, 1980, p.10).

Big data and the appropriation of habits

Returning to my empirical engagement with recommendation platforms, we could also distinguish between the influence of big data on memories and on habits. As the platforms kept recommending similar videos to me, it was habit that made me watch what they recommended instead of swiping these videos away; on the other hand, when I started to think about why I would be interested or not in certain kinds of videos, I was seeking for a memory which could explain or rationalize this relationship. Drawing on Bergson, Lazzarato explains how memories and habits exist on the same plane of consistency yet remain differentiated:

> A first memory is fixed in the body: 'a habit rather than a memory', says Bergson, or an 'automatic' or 'passive' recognition. Within this memory the past is conserved in the motor mechanisms of our organism. Strictly speaking, this memory is without image; it simply transforms movements received into movements executed. The second memory is a 'true memory' in which the past 'survives' in independent remembrances. We are dealing here with an attentive or intellectual recognition. We must remark immediately that, unlike the first, this memory is not installed in the body, but 'exists' in time. (Lazzarato 2007, p. 101)

The difference between habit and memory depends on how the past is 'actualized in the present' in relation to action. Habits are the sensori-motor mechanisms of the body, the 'disposition[s] to react in a more or less fixed way to one's surroundings' and without any delay. Memories, on the other hand, are the explicit 'recollections or representations of some specific past event[s]', the actualization of which requires the efforts of the mind or consciousness (Perri, 2014, p. 838, 841).

Moreover, in contrast to habits, memories do not initiate or require immediate responses to the stimulus from the outside but occur through a hesitation or delay in action. Hesitation creates a space - or more appropriately, a duration - which is also a certain degree of tension, in which consciousness intervenes and memories emerge. And hesitation itself is the effect of the intense modulation of the affective forces of the body:

> affect arises in a body when the sensori-motor schema achieves a complexity that allows indetermination and hesitation between different courses of action. Instead of an excitation causing an action in predictable sequence, the future action is interrupted or delayed, and replaced by an affective state within the body. (Al-Saji, 2004, p. 221)

Therefore, it is the modulation of affect that enables the actualization of memories which helps

[48] Hui, Y., 2009, 'The technology of forgetting', *The Digital Milieu*, 5 February, accessed 24 August 2022, <http://digitalmilieu.net/19/the-technology-of-forgetting/>.

'determine the future course of action' (Al-Saji, 2004, p. 221). Yet big data narrows down the space or time for hesitation by presenting plenty of media content, one after another, based on algorithmic calculations that reduce users' options to a minimum (e.g., watching or not watching, Like or Not Interested) and by shaping users' habits through personalised recommendation, which is also repetitive presentation of users' memories. Not merely providing services according to one's preference, big data actively cultivates their habits in ways that match with the subjectivity assigned to them. In this case, habits are considered as a force which is both constitutive of subjectivity and obstructive to the production of new subjectivity. This links back to my previous engagement with Lazzarato: The production of subjectivity does not only work individuated subjects but also with the component parts of subjectivity, in particular memory and habit. This is also where I differ from Stiegler: In his discussion of technologies as tertiary retention, he highlights the con-constitution or trans-individuation of the humans and technical objects (Kinsley, 2014), while I focus on the appropriation of infra-individual forces by big data and other technologies, which then become the components of different socio-technical machines.

In another way, we could also consider preference or subjectivity as a kind of habit. The latter is the habitual perception and understanding of a person, which others, including the algorithm, and him/herself develop over time. The digital production of subjectivity is never once for all. On the other hand, although we might be habituated to and internalize the subjectivity that big data assigns to us, there is still a tendency to escape from it, a desire for something new, as watching videos of similar content made me feel bored and start to think about why I would be interested or not in certain kinds of videos. It is exactly the repetition of big data recommendation that arouses hesitation. However, in response to the desire for something new, randomness is introduced in the algorithm of big data, so as to explore for new preferences of users, to develop new habits. This is also why big data techniques aim to be real-time: They want to capture the change of subjectivity and bring it back under control.

The discussion of big data from the perspective of the appropriation of memories does not finish the task of investigating its technicity. This section has been focused on big data's retaining of the past but we still need to consider what Kitchin (2019, 2014b, 2017) refers to as the 'realtimeness' of big data, that is, its relationship with the present. In the next section, I will turn to the temporality of big data, which is another important part of its technicity, and its role in the temporalization of being.

Section 3.2 Big Data as a Real-time Technology

Living in real time through big data

Although many studies (see, for example, Batty, 2016 and Kitchin, 2019, 2017) have discussed the

temporalities of big data against the background of smart city, which is also one of the contexts of my research, in this section I focus on the influences of the realtimeness of big data on the conduct of everyday life. In other words, this section is more focused on what Kitchin (2017) calls 'everyday time-geographies' or 'individual time-geographies' (p. 25). It does not mean that the existing studies on the realtimeness of smart city do not concern the changes of our daily lives; on the contrary, these changes are one of the most important consequences of the development of smart city. What this section aims to do is to shift the focus from the relationship between people and the city to that between humans and technics. More specifically, it attempts to investigate how the realtimeness of big data conditions the temporalization of being and the production of subjectivity. Continuing the work of last section, this section further discusses the technicity of big data and opens a discussion on the problem of technical unconsciousness in the big data era. I argue that the realtimeness of big data and other digital technologies is no more than an illusion, which comes from these technologies' operating on temporalities beneath or beyond the threshold of human experience and perception, rather than being strictly 'real-time' (i.e., instantaneous) per se. But before going to this point, I want to further examine what realtimeness means here.

As Michael Batty (2016, p. 143) remarks, temporality is the main dimension characterizing big data. Until very recently, data were often generated on the basis of relatively large temporal scales (e.g., weeks, months, quarters, years or even decades) and by planned, coordinated actions such as national census. These data only provided certain time slices for understanding the trends of changes over time. Moreover, all statistical analyses were based on past data even though they could be collected relatively recently (Kitchin, 2019, p. 782). In the big data era, on the other hand, data are generated continuously and in real-time. With ubiquitous sensors, cameras, smart phones and other devices, an event, a behavior, or a problem is recorded and data collected at the same time as it happens. In other words, there is 'simultaneity in the occurrence and registering of an event' (Heim, 1993, p .49). This realtimeness is the most important characteristics of big data. Of course, big data could be atemporal: For example, cross-sectional data with a significantly large sample size could also be considered as big data or not depending on the definition. But the primary concern of this subsection is the phenomenon of the continuous, real-time generation of data initiated by big data techniques, not just big data as a type of data with large sample sizes. This is what I will be referring to as the 'realtimeness' of big data.

In the continuous, real-time generation of data, what is captured is not merely an event but the ever-passing present. By capturing, I mean both that an event is recorded and that it seems that that we could really grasp the fleeting moments of the event. Time passes so fast – when we see a very emotional scene and take out our phone trying to photograph it, that moment has already gone. Yet big data functions so automatically and continuously that almost no moment would be missed. It sets up an always-on camera, constantly recording, filming, and capturing. As such there is little to no delay between an event and its registering. Operating on timescales or temporalities that are beyond our

perception, it seems that big data attempts to follow, keep pace with, and capture the ever-fleeting moments of everyday life.

Tung-Hui Hu (2012), a poet and scholar of digital media, traces the development of real-time technologies back to 1950s' America – although he argues that the locating of the origin is rather complicated or even impossible – at a time when computers had recently been invented and the nuclear threat imposed an urgency to track incoming Soviet missiles. It was the speed of nuclear attacks that prompted the development of real-time computation and real-time display of tracked objects (Hu, 2012, p. 179). Nowadays there is no such urgency or immediacy, but the desire to capture the passing present still exists, which is both a consequence and constitutive of the fast-changing nature of modern society. Instead of the nuclear threat, anxiety caused by modern life – wherein events are ephemeral and difficult to be grasped – initiates and sustains this desire for real-time recording of everything happening around us. Furthermore, the problem concerned now is not only to register a certain important moment in real time, but to capture the rapid changes of our daily lives, the areas we live in, and the world.

Big data is one of the solutions to the perceived need to record and respond to these rapid changes in real time. It not only provides the latest information about macro social changes as a new research technique (See Back et al., 2013 for the disscussion on real-time research) but also captures the changes on the micro levels of contemporary life, such as that of the traffic congestion of a crossing, the arriving time of a bus, or one's preference. I think the latter is more important for our understanding of the realtimeness of big data. The real-time information of micro changes is generated and utilized in people's personal engagement with big data, through which we can investigate the realtimeness not only as a characteristic of digital technologies but as temporality experienced by everyone. As Weltevrede et al. (2014) put it,

> Real-time experience is no longer limited to the elimination of a perceptible delay between the request, processing and presentation of information; instead, it informs modes of engagement, interaction and the speed at which responses to one's own actions are being shown. (p. 129)

When we talk about the realtimeness of big data, it does not only concern the realtimeness of such data or such technique but also the realtimeness of the apps, platforms, technical objects, systems and environments in which big data is embedded, as well as of the modes of life that big data technologies initiate.

Let's start with the realtimeness of data, in terms of which there are two senses that should be distinguished: On the one hand, when we say that 'We do not have real-time data', we mean that the data available is too old and we need something more recent; on the other hand, when we say that 'The data was not collected in real-time', it implies that when something happened, we did not record it immediately, or not at all. These two senses have different reference points of time – the former refers to the present when the data needs to be analysed while the latter to the past when the data was produced.

Moreover, they imply two different desires or immediacies: The former implies the desire for real-time data to satisfy the requirements of the statistical analysis, and the latter the desire to retain and represent the passing of time in the form of data. Nonetheless, these two senses could be unified in one process – when an event is recorded and analysed as soon as it happens, we would say that the data, for one thing, is produced in real time and for another, is real-time data for analysis. It is the dual sense of the 'simultaneity in the occurrence and registering of an event' (that the data is produced in real time) and the present-ness of data (that the data is real-time data) that defines the realtimeness of big data (qua data). In this case, I call real-time big data the 'data of the present' which is both a copy of the present and conditions present actions. Similar to what Bergson (1991) calls 'memory of the present', I think big data constructs 'a bridge between present perception [or actions] and the rest of the past' (Al-Saji, 2004, p .215).

There is not only real-time generation of data; they are also being streamed, processed, analysed and re-presented in real time. One of the consequences is that increasingly we are thrown into a world of continuous, real-time flows of data. Furthermore, with more and more digital devices embedded into urban infrastructure, and the development of apps/platforms that provide real-time information, we are increasingly *living in real time*. Kitchin (2017), in his study on the realtimeness of smart city, provides an account of how our daily lives are 'becoming more flexible and decoupled from clock-time' with activities and events shifting from being scheduled at specific times and places to being 'undertaken in-situ, on-the-move and in real-time' (p. 26). For example, with real-time public transportation information apps, people do not need to abide by the bus schedules, wait five minutes earlier at a bus stop and find the bus expected never showing up on time; rather, they could check the apps at any time and know exactly how long it will take for the next bus to arrive. Although the real arriving time of the bus often changes because of various contingencies, the data will also change accordingly based on calculation and prediction and keep people informed in real time.

Living in real time implies that people have to become accustomed to unexpected changes, which of course could be more abrupt and significant than the changing of a bus's arriving time. Real-time technologies such as big data provide us the means to confront perpetual uncertainty, indeterminacy and change. Another example is that during the Covid-19 outbreak, many online platforms were designed to provide real-time information about the trends of the epidemic, the number and distribution of new infections, the shortage of medical supplies and so on. These real-time data offer a possibility for people and the government to respond and react in real time. Regis McKenna, one of the most influential tech marketers in the last century, in his *Real Time: Preparing for the Age of the Never Satisfied Customer* published in 1997 already argued that

> Almost all technology today is focused on compressing to zero the amount of time it takes to acquire and use information, to learn, to make decisions, to initiate action, to deploy resources, to innovate. When action and response are simultaneous, we are in real time. (McKenna, 1997, p. 3-4)

This is especially the case for big data in terms of its automaticity, continuity, and velocity (Kitchin, 2013, 2014a), which reduces to minimum both the delay between an event and its registering and that between action and response.

Big data, as well as other digital and information technologies, does not only facilitate people to respond in real time but also seems to produce and strengthen this very imperative to act and respond in real time. For one thing, because more and more activities could be and are undertaken 'in-situ, on-the-move and in real-time' instead of being organized in advance, the time for acting and reacting is compressed – we do not leave much time for ourselves to hesitate; for another, the continuous streams of real-time information require constant attention and 'never-ending engagement' (Kitchin, 2017, p. 31) and also push us to react as fast as possible. The reactions could be as simple and minute as commenting on the latest post of a friend on social media, choosing an alternative route to avoid traffic congestion, deciding not to dine at a restaurant because of its decreasing rating, and so on. I call the realtimeness implied in these reactions 'local real time', in contrast to the global real time or what Hassan (2003) calls 'network time', that is, time globally networked and simultaneous:

> People across the globe can share temporal alignments in play (online games) and work (online conferencing), organizing themselves temporally around their interactions rather than local clock-time. (Kitchin, 2017, p. 27)

Yet, by local real time, I am referring to time locally or contextually networked. It is the real time relations (e.g., real time connection, response, and interaction) with, say, a friend, a bus, a restaurant, or the local environment we are in and engage with, which are always "in-situ, on-the-move and in real time".

On the other hand, living in real time does not only mean we have real-time information and react immediately. It also includes the collecting of users' data and the providing of corresponding feedbacks in real time by big data; that is, the real-time action and reaction of digital devices and platforms in their effort to capture the changes of users themselves. Take the real-time presentation of news, sports and other posts on social media as an example. It is real-time not only because the news and sports themselves are the latest but also for the reason that they are recommended and presented to users according to their present preferences. It is this second aspect of the realtimeness of social media that I would like to highlight. The ever-increasing amount of information makes it hard to find and choose the information we need, whereas social media provides a different way to organize and display the information, on which 'users do not have to search for content on static web pages … but content is brought to them instantly through automatically updating streams, recommendations and other dynamic elements' (Weltevrede et al., 2014, p. 130). Moreover, there is a shift in how social media streams the content, not only 'based on followings, friend connections, hashtags, or News Feed settings' (Weltevrede et al., 2014, p. 143), but more and more on a number of mechanisms which could be summarized as 'personalized recommendation'.

On social media platforms, personalized recommendation is a dynamic process. It usually starts from the self-orientation of users by choosing the fields they might be interested in when they log in to a platform for the first time, but more importantly, relies on users' following interactions with the platform, to predict their preferences, recommend different content to different users, and at the same time, explore the boundaries of their interests. The ongoing user interactions creates continually new, real-time data, based on which social media platforms both update their databases and adjust the content they present to users in real time. Weltevrede et al. (2014) defines the dynamic flows of content on social media as 'streams'. Below the streams of content are the streams of data generated from users' behavior, which encounter with each other on social media platforms and together constitute the dual realtimeness of media content. Or, to put it differently, there are two threads organizing the content presented to users: One is freshness, which is the realtimeness of the content in relation to itself; the other is (real-time) preference, which is the realtimeness in relation to the users. In this way, people are always interacting with social media platforms and the media content in real time.

Experiencing real time with big data

In addition to the real-time connection with others and the world, or with systems when we, for example, 'browse the newest post on the social media and comment', 'instantly connect with other people while on the move and schedule meetings on-the-fly', or 'discover when the next bus/train is due' (Kitchin, 2017, p. 22), during our engagement with big data, we are also encountering in real-time relations with ourselves, which is also what living in real time means. What we do, and who we are, are registered in real time and will be returned and represented to us immediately, such as through the videos recommended to us by TikTok or in the activities of the quantified self (Kitchin, 2021, p. 127-35) or self-tracking (Pink and Fors, 2017). As discussed in Section 2.1, there is continuous, real-time production and reproduction of subjectivity, which to a large extent determines the options and opportunities we are provided with and the information we have access to. The realtimeness of the digital production of subjectivity influences our relationships with our present, immediate past and immediate future, and it does so in two ways.

First, individuals, being thrown into the constant flows of data, are confronted with their past, the immediate past as well as relatively remote past, which was recorded and remembered by big data and thus reminds them of who they were in the past. This past is a past that we have to live with in the present. It is both a past in its whole and that which is selectively presented. For one thing, big data retains one's whole past engagement with it; for another, big data presents the past to us in the form of independent memories or recollections via different media (e.g., text, image, video, music, data, etc.), as I have discussed in last section.

Secondly, by providing real-time information and media content to us and recording our response to them in real time, big data makes us 'know and take part in the present' (Kitchin 2017, p. 22) and at the same time, constitutes the memory of the present or data of the present. According to Bergson, the memory of the present implies the splitting of time into two jets:

> Either the present leaves no trace in memory, or it doubles in each instant, in its very eruption, into two symmetrical jets, of which one falls back into the past while the other soars towards the future. (Bergson 1919, cited in Al Saji 2004, p. 217)

Every instant is split into 'a pure past and a pure present', that is to say, into memory and perception, as Lazzarato (2007, p.105) explains. Apart from the memory of our own, big data as exteriorised memory also participates in this splitting of time. Considering television and digital networks as 'machines to crystalize time', Lazzarato argues that they do not only constitute memory so that 'the present is conserved in the past', but also 'through *their functioning "in real time"*, work on the splitting of time, intervening in a time which is in the making' (Lazzarato, 2007, p .105). It is this 'intervening in a time which is in the making' that I think is the most important aspect to understand the realtimeness of big data. Real-time data (i.e., data of the present or the immediate past) conditions one's options, behaviors and activities in the present especially through the production of subjectivity, which are also often real-time, in turn feed back into the continuous streams of data. The recursion between the real-time production (and streaming, sharing, processing, analysis, application, etc.) of data and the real-time reaction of people conditions the making of the time.

Thirdly, we are also engaging with the immediate future when the data of the past and the present are used to predict what will happen and our behavior is adapted intentionally or shaped implicitly by systems according to the prediction of the immediate or near future. At the same, past and present data also condition one's options, behaviors and activities in the future and thus the making of the (immediate) future.

Despite the sequential adverbs I used to organize the argument, we engage with our immediate past, present and immediate future at the same time. As Weltevrede et al. (2014, p. 142) argues, 'The fabrication of real-time may entail an interplay between past, present and future'. This can be seen from the example of media streams which are continuous and never-ending and wherein the immediate past, present and immediate future interact and intermingle with each other. Immersed in these streams of media content and data, human consciousness can no longer clearly distinguish between the immediate past, present and immediate future and can only follow the streams. The interplay or coexistence of (immediate) past, present and (immediate) future creates what Uprichard (2012) terms 'plastic present':

> [W]here the 'past' and 'future' increasingly become a matter of hours or days, and ultimately more like our present 'present', the present itself becomes more and more plastic, to be stretched, manipulated, moulded and ultimately 'casted' by those who can access more of it in the supposed 'now'. (p. 133)

The demand for real-time data and information, or for realtimeness in general, causes people to emphasize immediate past and immediate future over relatively remote past and future. This leads us to recall Paul Virilio (1997, p. 25) claim that there is only the present, 'no future and no past', 'no extension and no duration'. Real-time technologies such as big data change our experience of the past, present and future by putting us into a series of plastic yet recursive presents and ensuring that we always (and only) know and take part in the present.

Moreover, becoming trapped in the plastic presents implies a certain kind of stickiness in the making of the future because of 'the recursivity of the digital with the world the digital represents' which structures time (Uprichard, 2012, p .132). In other words, big data technologies 'limit the possibilities of alternate emergent future' (Kitchin 2017, p. 32). The future to a certain extent is prefigured and predetermined, either by past and present data or the prediction of the future based on them and people's reaction towards it. Yet, besides the 'recursive, iterative path dependency for the future' (Kitchin 2017, p. 32), I think there is something else more fundamental in terms of the realtimeness of big data and other information technologies.

Realtimeness as an illusion

I argue that realtimeness is an illusion. As Kitchin (2017) notes, 'What becomes clear when one examines real-time systems closely is that they are never quite in real-time, they always include latencies' (p. 28). There are gaps between the occurring of an event and the registering of and responding to it, between the generation of discrete data points, and between the recording, processing, sharing and analyzing of data, no matter how fast big data techniques and devices (or other information and digital techniques) could operate and how imperceptible these gaps could be. For example, between the tweeting of a tweet and its publishing into the user's timelines there still exists an interval, be it milliseconds or picoseconds (Kitchin, 2017). The latency could result from the time systems/devices need to perform certain tasks (e.g., processing and computing), from specific, (un-)intentional settings of the systems (e.g., the censoring of media content), or from the modes of interaction between users and platforms. Moreover, the latency varies across different data, media, systems, platforms, and devices, as they have different rates of data generating and processing. Therefore, realtimeness is not a given temporality with which systems operate, but a temporal condition fabricated and assembled through the socio-technical conditions of the systems (Weltevrede et al. 2014, p. 127). Instead of being 'a flat, eternal now or a global, high-paced stream', real-time presents different speeds in relation to different devices, activities, and environments in which it unfolds (Kitchin, 2017, p. 141). In other words, we need to consider the materiality of big data when looking into its temporalities.

Delay, or latency, is constitutive of realtimeness. When we watch a film, what we perceive as motions

or continuous movements are actually simulations by the shift of, say, 'twenty-four frames a second' (Hu, 2012, p. 163). Similarly, the super-fast speed of data recording, processing, streaming, and analyzing, which is beyond our perception, creates the sense of realtimeness, while we do not realize that the functioning of big data and its temporalities (more than just realtimeness) are established on delay. As Hu (2012) remarks,

> we tend to forget that "the fundamental basis of real-time computing lies within the dimension of time—delay," a delay that is "rendered imperceptible to the human sensorium by the familiar tactics of cinematic projection." … delay is a fundamental part, not just of real-time computing, but of real time itself, whether on television, in film, or on computers. (p.172)

It is the time which systems, devices and networks use to generate and process data, which Mackenzie (2007) terms 'machine time', such as 'seek time, run time, read time, access time, available time, real time, polynomial time, time division, time slicing, time sharing, time complexity, write time, processor time, hold time, execution time, compilation time, and cycle time' (p. 89-90), that constructs the real time of the systems and the very sense of realtimeness. By 'real time', following Hu (2012), I refer to the general, unmeasured time of the operation of a system. Hu (2012) distinguishes between real time and real-time. For him, the latter indicates the speed or rate of change, while the former is 'a synonym for virtuality, or even its putative opposite, realness' (Hu 2012, p. 163).

The delay results from the time for machines (and people) to act and react, and we could call it technical delay. On the other hand, I think there is a delay more fundamental – I call it a metaphysical delay – which results from the passing of time itself. It is because of this metaphysical delay that I argue the digital production of subjectivity is problematic. Let us return to the analogy between cinema and big data first. Just like cinema, big data produces images of the passing present although in the form of data or any other form of media content (i.e., text, picture, video, music, etc.), whereas the passing present is uncapturable. Any attempt to fully capture the fleeting moments only fails. When we try to record a certain moment, the moment has already gone. Hu (2012) remarks, 'we always miss the "precious seconds", "the most important minute"— even if the interval is now counted in microseconds or milliseconds in the digital age' (p. 172). The instants we try to capture always escape from us. The real-time is always delay, an eternal delay rather than an eternal now.

In this sense, any real-time data is both generated 'too' late relative to the moment an event emerges and 'too' old in relation to the moment when it is analyzed and utilized. There is no real real-time data, strictly speaking. When past data, even data of the immediate past, is used to predict the present, the moment it represents has already gone, even before the data was generated, while in the new moment to be predicted, everything is different and unpredictable. This is not to deny the practical value of real-time data or the continuity and interdependency between the past and the present. Rather, I am arguing that even so-called real-time data cannot capture the process of becoming. The reason why we need real-time data is that in contemporary society where there are only changes, we are so aware of and

desire to capture them in real time. However, in the efforts to prehend these changes, we forget that becoming in itself eludes capture – by its very definition. The realtimeness of big data represents both a consciousness of becoming and a vain attempt to fully capture it.

Even if in an ideal state where an event is registered at the exact same time when it occurs (or its occurring is exactly its own recording), there is still a delay because what big data captures are what we are or what we were but also – from the perspective of becoming - *what we already no longer are*. As Deleuze (2007) puts it,

> We have to distinguish between what we are (what we already no longer are) and what we are becoming: *the part of history*, *the part of currentnes*s. (p. 345, original emphasis)

Big data takes what we were in the immediate past (or even remote past) as what we are in the present and extrapolates from this a sense of what we will be in the immediate future. By conditioning the options and opportunities we are provided with and the information we have access to, big data conditions what we are becoming to some degree, but, I argue, it can never fully capture the process of becoming. Instead, the continuous, real-time production of subjectivity actually hinders or predetermines the process of becoming by creating path dependency and limiting the possibilities of alternate future.

Being immersed in the continuous, real-time flows of data and living and acting in real time makes us forget that delay is the fundamental part of realtimeness and of the real time of big data. What we forget is time itself, the real time for a process to occur, time as the genesis of becoming. As Hu (2012) puts it,

> In their [i.e., real-time media and technologies] rush to capture the next instant, however, we lose the sense that any time has been lost at all: a loss of a loss. (p. 172)

Furthermore, it is forgetting that constitutes the very essence of technics and technicity. First, according to Stiegler, the forgetting of Epimetheus in the Greek mythology to distribute skills to humans – a metaphor for humans' own finitude (Stiegler, 1998) – sets up 'their necessity to produce technics' (Hui 2009, no page). In this sense, technics is in turn the forgetting of humans' own finitude, the forgetting of forgetting. Then technics is the forgetting of time, which is clear here in the discussion of the realtimeness of big data. On the other hand, forgetting is also the cure that we need – it is by forgetting, by diminishing the (digital) traces of our being, that becoming is possible. Thus, as Hui (2009) argues, we demand forgetting, especially in the era of big data.

Section 3.3 Big Data as Cosmotechnology

Technics as cosmotechnics

In this section, I engage with Yuk Hui's (2016b) conception of cosmotechnics in his seminal book *The Question Concerning Technology in China: An Essay in Cosmotechnics* to further discuss the technicity of big data and the problem of technical unconsciousness within the context of the digitalizing society of China. As stressed in the beginning of this chapter, the question of technicity concerns both the qualities which constitute a technology as technology and the relationship between the human and technology. Especially in terms of the latter, we cannot discuss it without taking into consideration the social and cultural context in which a technology is invented, designed, and used. In Chapter I, I argue that there is a peculiar symphony between the ubiquity of digital devices and technologies and the general indifference or unconsciousness towards it in the digitalizing society of China. Here drawing on Hui, as well as my own empirical observation, I want to further examine this particular relationship with digital technologies and where it originates, and suggest that despite the problem of technical unconsciousness, different relationships, or different ways of living with digital technologies are possible.

For Hui, the necessity to formulate a concept of cosmotechnics comes from the need to acknowledge and develop 'technodiversity',[49] not only for China but also for many different cultures other than the West. He argues that technics, not only including technical objects but understood as 'the general category of all forms of making and practice' (Hui, 2016b, p. 4), is both anthropologically universal as the exteriorisation of the body and memory and not anthropologically universal because 'technologies in different cultures are affected by the cosmological understandings of these cultures, and have autonomy only within a certain cosmological setting' (Hui, 2016b, p .19). To put it slightly differently, technologies should be understood in relation to the cultures in which they emerge, develop, and/or are used, and more specifically, to the cosmologies proper to the cultures.

Cosmology is not the same as astronomy, as the latter reduces the cosmos as 'an exploitable standing reserve' while different cosmologies represent different understandings of the relations between humans and nature (Hui, 2016b, p. 21). Initially appearing in the form of mythologies such as the tale of Prometheus (who stole fire from the god Hephaestus) in the West and those of Fuxi (伏羲, who invented the bagua (八卦), 'the eight trigrams based on a binary structure'), Nüwa (女娲, who created human beings with clay) and Shennong (神农, who invented agriculture, medicine, and so on) in China, cosmologies give different explanations of the origin of technics but more importantly, conditions its development throughout the history, since technics itself consists of the objects and activities that represent and mediate the relations between humans and nature (Hui, 2016b, p. 17). In other words,

[49] Hui, Y 2020, 'For a Planetary Thinking', *e-flux*, December, accessed 30 August 2020, <https://www.e-flux.com/journal/114/366703/for-a-planetary-thinking/>.

technical objects and the ways in which people produce and use them embody and are shaped by the cosmology of a culture. For Hui, 'technics is always cosmotechnics' (Hui, 2016b, p .19), and because there are different cosmologies, there are also different (cosmo-)technics and technicity. In this sense, even the same technology such as big data should be understood differently in different cultures.

Yet one of the consequences of industrialization and globalization is the reducing of the multiplicity of technics or 'the homogeneous becoming of modern technology'. Hui suggests that this homogenization, as well as the understanding of technics as universal, causes 'a huge obstacle to understanding the global technological condition in general, and in particular the challenge it poses to non-European cultures', especially in face of the dramatic development of digital and informational technologies (Hui, 2016b, p. 12). He further remarks,

> The technical systems that are in the process of forming today, fuelled by digital technologies (for example, 'smart cities', the 'internet of things', social networks, and large-scale automation systems) tend to lead to a homogeneous relation between humanity and technics – that of intensive quantification and control. But this only makes it more important and more urgent for different cultures to reflect on their own history and ontologies in order to adopt digital technologies without being merely synchronized into the homogenous 'global' and 'generic' episteme. (Hui, 2016b, p .31)

The homogeneous relation between humanity and technics is related to, or consistent with, that between humans and nature. As Heidegger notes, 'every being is reduced to the status of "standing-reserve" or "stock", something that can be *measured*, *calculated*, and *exploited*' (cited in Hui, 2016b, p. 3, emphasis mine). Especially in the big data era, everything, even humans themselves, has become data and this seems to be a universal phenomenon although with regional differences due to the different development levels of digital technologies.

For Hui, what we need is not a solution (or solutions) that can be applied to all cultures, but the reflection of each culture based on their own history, cosmologies, and ontologies, since the cosmotechnics proper to them contains the possibility to reunify humans with nature, to reconstruct the relations between humans and technics, between culture and nature. However, in his investigation into the question of technology in China, although he conducts 'a systematic and historical survey of "technical thought"' and a discussion of 'the historical-metaphysical questions of modern technology' (Hui, 2016b, p .33), he does not go further to inquire into the challenges posed by digital technologies and how they bring about the new necessity and possibility of reflecting on the question of technology. It is the task of this section to investigate the question of technology and technical unconsciousness specific to China in the big data era. But before further discussion on this issue, let us first turn to Hui's discussion on traditional philosophy of technology of China, for whom the critical relation is that between *Qi* (器) and *Dao* (道).

Traditional cosmotechnical thinking in China

To start with, *Qi* could be translated as 'tool', 'vessel' or 'utensil', or be used to refer to any technical object or artifact (Hui, 2016b, p. 65). According to *Shuowen jiezi zhu* (说文解字注), a dictionary of ancient Chinese etymology, *Qi* is the synonym of *Min* (皿), but *Min* refers to utensils or containers while *Qi* is the name for all tools.[50] On the other hand, *Dao* is much more complicated, and hard, if not impossible, to define. Indeed, if one can define what *Dao* is, then it is not *Dao*. Nonetheless, we could still understand *Dao* in its relation to form: According to *Xi Ci* (系辞), a commentary on the *I Ching* or *Book of Changes* (易经), 'what is formless (or above form) is called *Dao*; what has form (or is below form) is *Qi*'. Hui further explains that '*Dao* is what gives form and phenomenon; it is what is above them, as superior being' (Hui, 2016b, p. 99-100). In other words, *Dao* is the principle of every being, of the cosmos. However, Hui argues, *Dao* should not be understood as '"the laws of nature" as this term was understood in seventeenth century in Europe'; rather, it is 'the ungraspable' (Hui, 2016b, p. 100): We cannot grasp it; instead, we can only live in it without fully knowing it. Although *Dao* is above forms, it is not above beings; rather, it exists 'everywhere and in every being' (Hui, 2016b, p. 66). In a famous poem of Wang Yangming (王阳明), one of the most important Confucians in Ming Dynasty (1368-1644 A.D.), we read that *Dao* is 'not distanced from, but immanent to, the daily life, [yet] traced back to the time before the world is created'.[51]

Moreover, Hui suggests, *Dao* is not only cosmic order but also moral order (Hui, 2016b, p, 88). The word 'order' could be debatable because as Hui himself indicates, Daoism is against all kinds of 'imposed order', but what he tries to argue is that in their pursuit of *Dao*, both Confucianism and Daoism, two of the major threads of traditional Chinese philosophy, emphasize the realization of 'the "moral good" of the cosmos'. This moral order does not concern 'heteronomous moral laws'. Rather, for Confucianism, it is about the 'creation and the perfection of personality' ; for Daoism, it is to 'reach the *Dao* by being natural', to be part of nature (Hui, 2016b, p. 62-5, 115). Moreover, the presence of *Dao* in beings is in the form of *de* (德, transliterated as 'virtue'), which has nothing to do with 'virtue or moral perfection', but implies the harmony between beings and the cosmos (Hui, 2016b, p .66). To achieve the perfection of personality or to be natural is to act (or not act) according to the harmony or unification between humans, other beings and the cosmos; or simply put, to live in harmony with the cosmos.

According to Hui, living a moral good life was the common question of Confucianism and Daoism (Hui, 2016b, p. 63). Furthermore, he notes, 'to live is to maintain a subtle and complicit relation with *Dao*' (Hui, 2016b, p. 69). It is the question of living that constitutes the essence of the pursuit of *Dao*. Hui remarks that '[t]he knowledge of living thus consists of two parts: understanding a general principle of

[50] Duan, Y 1988, *Shuowen jiezi zhu*, Shanghai Classics Publishing House, Shanghai. In modern Chinese, *Qi* has more meanings such as 'organ', 'tolerance', 'talent', 'personality' and 'thinking highly of', when combined with other characters, but they are irrelevant to my discussion here.
[51] Wang, Y 1992, *The Complete Works of Wang Yangming*, Shanghai Classics Publishing House, Shanghai.

life, and becoming free from functional determination' (Hui, 2016b, p. 104). He does not expatiate on the general principle of life (i.e., *Dao*) because it is unspeakable, it is not really knowledge. The second part is much clearer: To become free from functional determination means not to be limited by any purpose or predetermined telos. However, is the pursuit of *Dao* not a kind of purpose? Citing Kant, Hui (2016b, p. 308) suggests that we could understand the pursuit of *Dao* as the 'purposiveness without purpose'.

We can read the second principle from the Confucian teaching of '*junzi bu qi*' (君子不器), which could be translated 'the gentleman is not a utensil'. This teaching suggests that a utensil is bounded, serving for certain purposes, but that *junzi*, the man of noble character or moral integrity, which is 'the ideal personality of Confucians', is unbounded in terms of magnanimity, talent, knowledge and so on (Hui, 2016b, p. 100). Here *Qi*, or technical objects, seems to be underplayed. However, becoming free from predetermined purposes or functions is also a principle for technical objects or the making and using of them. To illustrate this, Hui quotes the story of a butcher Pao Ding from *Zhuangzi* (庄子), a classic of Daoism: When dissecting a cow, 'Pao Ding's knife never cuts the tendons, not to mention coming up against the bones: instead, it seeks the void and enters it with ease'. As such, 'Pao Ding does not exploit the purposely built-in features of the knife – being sharp for cutting and chopping – but endows it with a new usage in order to fully realise its potential (as being sharp)' (Hui, 2016b, p. 104).

Recall that for Deleuze and Guattari, as I discussed in Section 2.2, technical objects, when understood 'machinically', 'do not have a purpose' and thus are 'non-teleological' (Smith, 2018). They use a knife rest as an example: 'can we possibly guess, for instance, what a knife rest is used for if all we are given is a geometrical description of it?' (Deleuze and Guattari, 1977, p .3) Smith further explains,

> A knife-rest is obviously built with a certain purpose in mind, but there is nothing in its structure which prevents it from being used in different contexts, to carry out different functions. One could perfectly understand what the knife-rest is in terms of its actual properties, but this does not at all exhaust what it can *do* […]. (Smith, 2018, p. 100, emphasis in orginal)

What is different here is that it is in the pursuit of *Dao* that the 'default' functions of a technical object are abandoned and its full potential could be realised; it is the *Dao* that guides the making and using of technical objects. As Pao Ding himself claims, 'What I love is *Dao*, which is much more splendid than my skill' (Hui, 2016b, p. 102). It is through the becoming free from functional determination, of both technical objects (and technics in general) and ourselves, that we could approach the general principles of life. To explain this, I would like to further investigate the relationship between *Qi* and *Dao* in traditional Chinese philosophy of technology.

Technics, as 'the general category of all forms of making and practice' (Hui, 2016b, p. 4), is the intermediary of the relations between humans and nature. It is in different forms of making and practice that we engage with nature. In this sense, *Qi* should be an instrument for the pursuit of *Dao*. However,

the relationship between *Qi* and *Dao* is much more complicated in traditional Chinese philosophy. For example, the Confucian teaching of *junzi bu qi* seems to suggest that *Qi* could hinder the pursuit of *Dao*. Hui also observes that for Daoism, being obsessed with *Qi* contradicts or spoils *Dao*, 'caus[ing] *Dao* to deviate from its pure form', because 'if one always thinks in terms of machines, one will develop a machinic form of reasoning' and furthermore, 'developing such a reasoning about life, one will lose the way, and along with it, one's freedom' (Hui, 2016b, p. 106). Simply put, we might say that relying too much on technical objects would become a burden by limiting the freedom of life.

Yet Fingarette (1972) argues that *junzi bu qi* should not be interpreted prima facie: It does not only suggest that *junzi* is not determined by certain purposes as a utensil but implies *junzi* should be 'the morally self-realized man, the man with broad (moral) capacities' (p. 73) as represented by a specific kind of technical object, *Li Qi* (礼器, often translated as 'holy vessel'). Therefore, *junzi bu qi* should be translated as 'the gentleman is not a (normal) utensil (*Qi*) – but a holy vessel (*Li Qi*)'. *Li Qi* refers to different artefacts used in rituals, which are 'indications of identity and rank in the social hierarchy'. Moreover, *Li Qi* is associated with 'a kind of cultivation and practice that nurtures moral sensibility', that is, *Li* (礼), which could be translated as 'rite' or 'rule of propriety'. It is through the use of *Li Qi* that *Li* is practiced and thus the moral good is nurtured and maintained. Hui further claims that 'for Confucianism, [*Li*] *Qi* functions to stablise and restore the moral cosmology through ritual' (Hui, 2016b, p. 109-10). In other words, *Qi* and *Dao* are united in the practice of *Li*. Furthermore, it is by carrying (or representing) and being in harmony with *Dao* that *Qi* could become sacred, as in the case of *Li Qi*, or perfect as in the above-mentioned story of Pao Ding (Hui, 2016b, p. 101).

Therefore, the relation between *Qi* and *Dao* is ambivalent. As Hui puts it, on the one hand, *Dao* 'stands for the completion of technics in the name of nature' and at the same time, 'needs Qi to carry it in order to be manifested in sensible forms',[52] which implies the unification between *Qi* and *Dao*; on the other, *Dao* is 'understood as a resistance of the spirit against technics, which always have the potential to contaminate it' (Hui, 2016b, p. 101, 116). I argue that in traditional Chinese thinking of technics, there is unification between *Qi* and *Dao* but with *Dao* as the fundamental, the ultimate truth and pursuit. As a result, although *Qi* needs *Dao* to be perfect and could be a way to approach *Dao*, the former is not necessary for the pursuing of the latter and could even impede it. To put it differently, there seems to be a paradox in the making and using of technics: Technical objects and practices exist everywhere in our daily lives and mediate the relations between humans, nonhuman agents, and nature; however, there is the possibility and even necessity to lead a moral and good life, a life that achieves harmony between

[52] This is arguable because as I have mentioned above, *Dao* is present in every being and then why do we need technical objects to manifest it if we can find it in everything and in ourselves? One possible explanation is that although *Dao* is everywhere, we might not be aware of the existence of it or able to recognize it in ordinary, natural things and thus we need technics (e.g., *Li Qi* and writing) to manifest it to us. In any case, for both Confucianism and Daoism, *Qi* is not necessary for the pursuit of *Dao*. For example, there is the Confucian teaching, *ge wu zhi* (格物致知), which means 'to study the phenomena of nature in order to know the principles' (Hui 2016, p. 183).

humans and the cosmos, without the intervention of technics.

Nonetheless, it is clear that for both Confucianism and Daoism the problem is not about whether to rely on or fully abandon *Qi* in pursuit of *Dao*. Rather, their teachings concern the becoming free from functional determination, of both humans and technical objects (as shown in the example of *junzi* and *Li Qi* or that of Pao Ding and his knife). From traditional Chinese thinking of technics, we read that to live is to be free from functional determination, to be in harmony with nature, with or without the mediation of technics, to the extent that technical objects and practices also become natural or become a part of nature. Above all, for Hui, the *Qi-Dao* relation represents 'a unification of moral and cosmological thinking', which grounds the traditional thinking of technics in China (Hui, 2016b, p. 35). This unification of moral order and cosmological order in and through technical objects and activities is what he calls 'cosmotechnics'. It implies both a philosophy of technology and a philosophy of life.

Yet the development of modern technology causes a disjunction between technology and cosmology and strengthens the mutual functional determination between humans and technical objects (or machines). Here, we could turn to Martin Heidegger, one of the most important and influential philosophers of the 20th century, for the discussion on the relationships between humans and modern technology. For Heidegger, 'the essence of modern technology is not technological, but rather enframing (*Ge-stell*)' (Hui, 2016b, p. 3). In his introduction to Heidgger's *The Question Concerning Technology and Other Essays*, William Lovitt further explains that

> The challenging claim that now summons man [sic] forth, that 'gathers man [sic] thither to order the self-revealing as standing-reserve', Heidegger calls *das Ge-stell* (Enframing). As 'Enframing', that claim ceaselessly brings both men [sic] and things to take their places in the stark configuration that is being wrought out through ordering for use. (Heidegger, 1977a, p. xxix)

Different from Heidegger's human-centred relationship between humans and technology, I read 'enframing' as the functional determination of both humans and nonhuman agents (including technical objects) in all kinds of social-technical machines. For humans, the problem concerns the (digital, mechanical and institutional) production of subjectivity; for technical objects and other things, functional determination means being made to serve certain purposes (instead of others) and more fundamentally, being appropriated as objects for use, or using Heidgger's term, standing-reserve. In a big data era, humans and things are appropriated not only as labor, tools or physical resources but also as both data and data producers. It is in the continuous, real-time production of data and subjectivity that humans and things are assigned with various roles and functions.

Through the discussion of the *Qi-Dao* relation based on the research of Hui (2016b), my aim is to provide a cosmotechnical understanding of the production of subjectivity and machinic enslavement in the big data era and at the same time, to relate the question of technology to the question of life. A cosmotechnical way of thinking could link the relation between humans and technical objects with that between humans and nature. From this perspective, it is the dissociation of technology from cosmology,

which is also the dissociation of humans from nature, that makes things and inevitably humans themselves into the standing-reserve identified by Heidegger. Moreover, the functional determination of technical objects in turn conditions that of humans both as tool-users (or machine-operators) and the component parts of all kinds of social-technical machines. The process of machinic enslavement could be understood as the mutual functional determination between humans and technical objects. In terms of big data and other digital technologies, the ways in which they are designed and used especially in everyday life influence the choices and possibilities of people, but this does not mean that different relationships between humans and digital technologies could not be possible.

Abbinnett (2015) suggests that for Stiegler, pharmakon characterises the totality of the relations between the human and technology: 'the antagonism between the toxic reduction of life to capitalized desire and the expressive forms of cathexis (love, spirit) that have been made possible by the techno-hybridization of human beings' (p. 66). Drawing on this concept, I argue that digital technologies do not only condition people's daily lives through the production of subjectivity but could also make unexpected, unplanned connections between people in which the relation between the human and technology is also reshaped. This will be further discussed in the next chapters through empirical analyses. In the rest of this section, I want to discuss the problem of technological unconsciousness in the digitalizing society of China, which is related to the forgetting of cosmology in the development of modern technology and at the same time, crucial for the rethinking of the human-technology relationship within this context.

Technical unconsciousness in China's big data era

Although the development of big data raises concerns about privacy and surveillance, the awareness of these issues is important but not enough to uncover the problems we are currently facing. I argue that the more fundamental problem is the technological unconsciousness that underlies the making and using of technical objects and that conditions people's daily lives. We should distinguish between technological unconsciousness and the technological unconscious, or what Patricia Clough drawing on Derrida, terms 'the technical substrates of unconscious memory'. By the latter, Clough suggests that 'the unconscious is shaped as much by a technical substrate as by the individual subject's history' (Clough, 2000, p. 19). According to Hui, technological unconsciousness is, first of all, the 'lack of awareness of the instruments at hand, their limits and their dangers', but also the unconsciousness of humans' own finitude, of time (Hui, 2016b, p. 39, 42) and, I add, of the unification between humans and nature. For him, following Heidegger, modern technology is both constitutive of and constituted by such unconsciousness: On the one hand, it is the development of modern technology that makes humans forget their own finitude; on the other, it is the desire to overcome human's finitude and eventually the

forgetting of it that drives the dramatic development of modern technology – 'modernity functions according to a technological unconsciousness' (Hui, 2016b, p. 42). As Hui puts it, 'it was this technological unconsciousness that granted the *cogito* the will and the self-assurance to exploit the world, without perceiving the limits of this exploitation' (Hui, 2016b, p. 224).

Furthermore, I argue that it is the forgetting of the association with nature that results in the forgetting of human's finitude. When we forget that we are part of nature to the extent that the latter becomes something to exploit, we also forget our own limits, falsely assuming that everything is possible with the development of technology. In this sense, when explained in the terminology of traditional Chinese philosophy, technological unconsciousness is the forgetting of *Dao*, the disassociation of *Qi* from *Dao*. It is when *Qi* detaches from *Dao*, or technics from cosmology, that we find we are no longer connected with the cosmos – more likely, we are even not conscious of such detachment and disconnection. Hui (2016b) argues that it is the loss of cosmotechnological thinking that leads to technical unconsciousness and associated problems in China.

Moreover, technological unconsciousness also includes the unconsciousness of the relations between humans and technical objects, between humans and machines. Although we are well aware of, say, the exploitative nature of capital, factories and their machines, and modern corporations, we tend to ignore our relations with the common technical objects that mediate our daily lives. By the relations between humans and technical objects, I do not specifically refer to the dual functional determination or machinic enslavement. There are different kinds of relations between humans and technical objects, as well as different ways to contemplate them. Since technical objects are everywhere, 'function[ing] as the condition for, and as the unconscious part of, our everyday experience' (Hui, 2016b, p .234). We are too accustomed to their existence and could not jump out from our daily engagement with them to reflect on the humans-technical objects relations other than that of users/makers-tools.

I argue that in the big data era such technological unconsciousness becomes a kind of data unconsciousness. Although we deal with big data every day, for example, when we search for something on Google, purchase something and make the payment online, browse the latest post of a friend on social media, check the ranking of a restaurant nearby, cross an intersection with traffic lights, call a taxi with Uber, and so on – almost every behavior produces or invokes data and every activity is mediated by data, even though we are not often conscious of its existence in daily life and its influences. It is the everydayness, ordinariness, and embeddedness of big data and the unconsciousness towards it that I would like to highlight for a digitalizing society of China. What is worth noting is not the controversial use of big data in some special cases reported in the media but, for example, the visibility of facial recognition devices in a small, private convenience store or an ordinary residential area, as I have witness in China.

But it does not mean that people are completely unconscious of the problems that the data of and about

us is being produced, collected, stored, streamed, analysed, and traded, that data and algorithm together condition the choices we have and the decisions we make, or even make decisions for us, to a greater or lesser degree, or that we have become walking streams of data, become a part of the technical objects which we make and use and which are becoming 'smarter and smarter'. Neither does it mean that there is not any reflection on or dispute over it in society as a whole. Rather, data unconsciousness refers to an overall indifferent attitude towards information and digital technologies which conditions people's daily engagement with them. This is the most significant feature that I observe during and through my empirical research, as I myself are astonished by how easy and quick it is for people to accept and become accustomed to new digital technologies in China. By indifferent, I mean people use digital technologies a lot without much reflection on them. When Robin Li said that if people 'can trade privacy for convenience, safety or efficiency, in many cases, they are willing to do so […] If the data can benefit the users, and they are willing to allow us to use it, we will use it' (see Chapter 1), he was indicating the somewhat pragmatic attitude towards digital technologies of both users and engineers. Nevertheless, I think, indifferent, rather than pragmatic, could better describe current technical unconsciousness. This indifference is related to the ordinariness of digital technologies: They are too common to get more attention. During the last decades of rapid economic growth and technological development in China, people have become accustomed to and quick to accept the (continual) emergence of new technologies. It is in this kind of environment that people become indifferent to the pervasiveness of big data and it is because big data has become part of everyday life that the reflection on it is rare just as people tend not to question their behaviour of eating and drinking. As such the ubiquity and everydayness of digital technologies and the indifferent attitude or unconsciousness towards it constitute a symphony. I think this symphony is characteristic of the relation between the human and technology in the digitalizing society of China.

Although the problem of technological unconsciousness is universal (yet not homogeneous) because of technological globalization, there is no reason that we could expect a solution – a way to develop technological consciousness – that could fit all cultures. Such a solution would only further decrease culture diversity and technodiversity, which risks accepting a universal understanding of (cosmo-)technics, 'a universal history of technology and a cosmopolitanism without world history'. Hui asks, 'is the China of today [as well as other non-European cultures] ready to take up the question of technology and to give it sufficient reflection from the perspective of its own culture and tradition?' (Hui, 2016b, p. 242). The reason he uses 'the China of today' is because for him, before the history of modernisation,

> The mastery of the world as a will to power did not emerge in China, and technological unconsciousness, since it produced such a negligible effect, was never a problem to be overcome. (Hui, 2016b, p. 241-2)

To address the problem of technological unconsciousness in the big data era needs to reinvent cosmotechnics, reinvent the *Qi-Dao* relation proper to the time. That is to say, the relations between

humans, technics and nature should be rediscovered and reinvented based on China's own culture and tradition (Hui, 2016b, p. 196-7). Such reinvention is not to conserve or return to a tradition. Instead, the aim of Hui's cosmotechnical approach is to re-appropriate modern technology (here especially information and digital technologies) 'from the standpoint of cosmotechnics', which 'demands that we reconfigure fundamental metaphysical categories such as *Qi-Dao* as a ground' so as to reconstruct the unity between humans and nature (and even the cosmos) and 'to renew a form of life and a cosmotechnics that would consciously subtract itself from and deviate from the homogeneous becoming of the technological world' (Hui, 2016b, 309).

It is worth emphasizing that the reason why I have turned to Hui's work on cosmotechnics is that I want to situate the technicity of big data and more specifically, the question of the relationship between humans and digital technologies in the context of China, in particular the contemporary Chinese (smart) urbanism. Following Stiegler, Hui's analysis of cosmotechnics highlights the intergenerational aspect of technology, that is passing exteriorised (social) memory from generation to generation (see, for example, 2016b, p. 215), but my focus is less on this: As shown in Section 3.1, this project is more concerned with the externalization of individual memory rather than social memory.[53] Rather, through a reading of Hui's work, I examine the cultural aspect of digital technologies – particularly big data and smart cities here – and discuss the possibility of different relationships between humans, technologies and cosmologies in the specific context of China. I further suggest that taking them as a kind of cosmotechnics provides us with an entry point to think with the ontological, rather than ideological or epistemological, ground of the development of big data and smart cities in China.

As Söderström (2021) argues, the difference between different smart city initiatives and discourses, as well as practices, are not only epistemological – in terms of how they 'have different representations of what smart cities are – but also ontological as 'different types of data, technologies, users and relations between them' are deployed (p. 401). The metaphysical ground presupposed by the relationship between humans and (digital) technologies in contemporary China, for Hui, is the loss of the *Qi-Dao* relation which conditions the problem of technological unconsciousness. While in Hui's cosmotechnics, the *Qi-Dao* relation is a relation between the human and nature mediated by technical objects, I refocus it on the relation between the human and technology, in which both humans and technical objects are free from functional determination and relate this with Deleuze and Guattari's conception of the machine. In so doing, I imply that different relationships with digital technologies in China is possible.

Moreover, drawing on Hui's work, I argue that the question of technology is also the question of life, especially in relation to the digitalizing society of China. It is in everyday life which is embedded with and mediated by ubiquitous digital devices and technologies that people become unconscious of the

[53] I am grateful to the examiners' comments on this point.

power relations within them. On the other hand, I argue, to lead a different life is also to rethink and reinvent the relations between humans and technologies. In relation to the peculiar symphony constituted of the ubiquity of digital technologies and the general indifference or unconsciousness towards it, it does not necessarily mean people need to develop a kind of technical consciousness or, as (Kitchin, 2021, p. 222) suggest, 'enact "a digital ethics of care", and claim and assert "data sovereignty", such as 'acting in moral [and active] ways with respect to the generation and use of [their own and others'] data'. The ethics of digital care and the claiming of digital rights and entitlements are important, but I suggest that exploring different ways of living with digital technologies could also be a 'line of flight' (Guattari, 2015) through which people could escape from the production of subjectivity and the digital modes of control enacted by digital technologies. The *Qi-Dao* relation, as the unification of cosmological order and moral order, implies a general principle of life: To live means to become free from functional determination. In the big data era, this principle should be given new meanings, for which, I suggest, 'becoming a digital nomad' could be a slogan. This will be further discussed in Chapter 6. But this does not mean that the project of reconstructing *Qi-Dao* relation is anthropocentric, because it also implies establishing new relationships with technical objects and other nonhuman agents, making new connections with and through them.

Last but not the least, I suggest that technological/data unconsciousness is also political unconsciousness. First, being unconscious of the limits of technology and our relations with technical objects means that we could or would not rethink and change such relations and thus to find a way out of the enslavement of different machines which are both technical and social but more importantly, are becoming increasingly datalogical. Second, the development of 'data-driven science' (Kitchin, 2013, Miller and Goodchild, 2015) and computational social sciences, especially those based on big data, implies that there is a methodological and epistemological turn, or as Clough et al. (2018) terms it, a 'datalogical turn'. I would argue that this datalogical turn does not only happen in academic research but influences the production and dissemination of knowledge and discourse in everyday life and reshapes the knowledge/power relations. These are what I am going to address in the next two chapters through empirical analyses.

In this chapter, I discuss the technicity of big data from three aspects: exteriorised memory, realtimeness, and cosmotechnics. These three aspects are also three different levels through which I approach the relations between the human and big data as a technology, that is the 'dividual', individual and social (which is also historical). While for Stiegler, technology as tertiary retention exteriorises the social memory which are transmitted from generation to generation, I focus more on how big data appropriates memory and habit as pre-personal force and thus conditions the production of subjectivity. Then I move to the realtimeness of big data to discuss the individual experience of it, addressing the question of how the temporalities of big data conditions the temporalization of consciousness during people's everyday engagement with it. The conditioning of the temporalization of being by technology is also an idea I

learn from Stiegler and Hui's reading of him, but instead of re-emphasizing the technological dimension of the already-there or the historical, I focus on how big data and other digital technologies fabricate a 'plastic present' so that people always live in real time, which nonetheless limits the possibilities of the future. Finally, turning to Hui's discussion of cosmotechnics, for whom technology should be understood in relation to the social and cultural context proper to it, I discuss the relationship between humans and big data (and other technologies), which I suggest could be characterised as the peculiar symphony constituted of the ubiquity of digital technologies and the general indifference of the society towards it, and the problem of technical unconsciousness in relation to the digitalizing society of China. It should be noted that this chapter in part extends the discussion of the role of big data in the production of subjectivity through the perspective of its technicity and more importantly, similar to the discussion of Deleuze and Guattari's conception of the machine in last chapter, implies the possibilities of different relationships, or different ways of living, with technologies.

Chapter IV. Smart Urbanism in China

In this chapter, I investigate the development of smart urbanism in China based on the empirical evidence collected both from online materials including government documents, news report, media articles, etc., and from the fieldwork I conducted. In addition to interviews, a large part of the empirical analysis is also ethnographic research based on my own experience as an ordinary citizen living in Shenzhen, Hangzhou and other cities of China. In the first section, I present a sketch of what smart cities looks like in a digitalizing society of China. I characterise a smart city as a city of flows in which not only is everything constituted in and through flows – human, objects, capital, technologies, information, and data – but the production and governance of urban space is also based on the modulation of flows. As Huang (2021) puts it, 'It is not so much that people and things flow in space, but that these flows create space, while cities are precisely the means to create the order of flows, and urban governance is the governance of urban mobility'.[54] On the other hand, following Gabrys (2014), I highlight the embedding of digital devices and technologies throughout the urban space and everyday life, as 'the distribution of governance within and through environments' (p. 30). It should be noted that I attach a lot of pictures (with the sources indicated in the footnotes) to highlight the ubiquitous visibility of digital devices and technologies, instead of implicitly hidden in urban environments. Then, in the second section, I investigate the project of the City Brain which as a city data and management hub enables centralized, real-time control of a city and entire city flows by integrating the networks of sensors and cameras distributed across the city and the databases, management platforms, services, and functions of different government departments. Through this centralized modulation of city flows, the City Brain effects what Coletta and Kitchin (2017) call 'algorhythmic governance' – algorithmic rhythm-analysis and rhythm-making. Moreover, drawing on Deleuze and Guattari's understanding of the difference between machines and organisms, I argue that the development of the City Brain implies a trend of the 'becoming-organism' (Smith, 2018) of cities, that is, becoming a centralized, hierarchized, and self-regulated body. Finally, in the third section, I introduce the application of the Health Code during the outbreak of the Covid-19 when the movement of humans and things was largely restricted, and many existing ways of life were interrupted while new ways of life created. Specifically, I discuss how the movement of humans produced and was in turned conditioned by the flows of data within this specific context and how the Health Code as a big data technology participated in the production of

[54] Huang, H 2021, 'The Governance Connotation of "City Brain"', *Social Science Weekly*, 11 March.

subjectivity and actualised a digital mode of control.

Section 4.1 Assembling a Smart City

In this section, rather than taking the materials collected online or from the fieldwork as separate and individual cases, I handle these materials integrally and combine them together to assemble an exemplary smart city which I term 'the Flowing City' and, in Deleuzian terminology, can be understood as 'real without being actual, ideal without being abstract' (Deleuze, 1994, p. 208). The reason for taking this approach is that I want to take this pieced-up city as a miniature of the digitalizing society in China. There is, of course, geographical unevenness in terms of the development of big data and smart city, but I observe that the ubiquity of digital devices and technologies and the ways of life they create are common across cities of China. Rather than referencing specific cities or case studies, I want to give a general idea of the urban environment and everyday life that people could encounter in almost any Chinese city, although some of the devices and infrastructures that I introduce might occur in some cities but not others. Through a tour guide of the Flowing City, I want to tell the readers/tourists that we are not in any city of China because every city is the Flowing City.

Let's begin the tour.

'For optimal and safe transportation'

It is rather difficult to describe the panorama of a city because there are so many people, infrastructure, buildings, and landscapes. Therefore, I suggest we could start from a technical object which could be found almost everywhere yet also often inconspicuous, the streetlight. A government official I interviewed remarked that in terms of smart city, one of the major focal points was streetlights (Interviewee 7, Weifang, 2019). In the Flowing City, the streetlights are becoming smart today: While traditional streetlights are controlled by switches and circuits, and the city employees could only turn on or off the lights on a whole street, Smart Streetlights are equipped with sensors and controllers which could modulate the switching-on or -off time and luminance of each single light according to day length, time, weather, traffic flow, and so on.[55] For example, when it detects a car approaching, the light will be automatically switched on, and when the car has passed and no further movement is detected, it will be switched off to save the energy.

[55] 'The country's first new urban lighting infrastructure concentration area was built in Tianjin', *Sina*, 2 May 2021, accessed 14 October 2022, <https://finance.sina.com.cn/tech/2021-05-02/doc-ikmyaawc3103629.shtml>.

Figure 1: A Smart Streetlight[56]

There are different kinds of environmental sensors installed on or in the lamppost which could measure and monitor temperature, humidity, wind speed and direction, air quality (e.g., PM2.5) and road waterlogging level especially during the days with heavy rain. For example, if the water on the road is too deep, say, reaching 30 centimetres and when the cameras detect people entering the water-logging area, the lamppost will send an alert to the backstage management system and the staff will remind the passengers via remote voice broadcast, 'You are already in an area with deep road water and the water depth is 30 cm. Please be careful.'[57] In general, these sensors could provide real-time data for urban environmental and meteorological surveillance. The sensors also monitor the functioning of the lamppost itself: If abnormal data is recorded, an alert will be triggered in real time and the management department will dispatch a technician to check it.

Taking a closer look at their structure, we can find that on the top of the lights, and besides the LED lamp and control system, there are telecommunication devices such as 5G micro base stations and Wi-Fi transmitters. Below these devices, there are cameras and environmental sensors which I have mentioned above. There is also an interactive screen which presents advertisements and broadcasts emergency notices and on which people could search for information (e.g., traffic conditions, parking lots, etc.). There is also an 'emergency call' button through which people could contact the help centre

[56] Source: < http://tj.sina.com.cn/news/m/2019-07-14/detail-ihytcitm1873888.shtml>, accessed 14 October 2022.
[57] 'Smart streetlights allow Tianjin citizens to experience smart services', *CNR*, 11 July 2019, accessed 14 October 2022, <http://news.cnr.cn/native/city/20190711/t20190711_524688260.shtml>.

in an emergency and the staff from the help centre could monitor via the cameras what is happening on site and determine an appropriate response. The bottom of the lamppost is a charging pile for electric vehicles and portable devices (e.g., smart phones and drones). Of course, traffic lights and road signs could also be installed on the lamppost. Given the density of streetlights, the prevalence of Smart Streetlights has the potential to further traffic management and video surveillance. With all these functions, the Smart Streetlights are not only streetlights. They have become the 'nerve endings' of the smart city,[58] especially equipped with different sensors and cameras. In other words, they help the city to sense itself (Gabrys, 2014). Moreover, these streetlights are not independent, but all linked to the backstage management system and with each other. Although they themselves are fixed in certain positions, we could imagine a massive network of flowing data across them. As Cresswell (2011) suggests, we should not 'take certain kinds of fixity and boundedness for granted and instead start with the fact of mobility' (p. 551). This is a methodology, that is starting with mobility, I adopt when engaging with and understanding the smart devices and infrastructures as what Castells (2010) calls 'the material organization of time-sharing social practices that work through flows' (p. 442).

Not only streetlights but traffic lights are also becoming smart. With the introduction of the projects of Smart Traffic, big data has been used in traffic management. For example, based on past data, a day is divided into several periods – peaks, lows, and flats. During the peak periods, when the traffic is super-busy, big data is used to analyse the traffic pressure of each intersection within an area and an optimal pressure balancing strategy is chosen among the alternatives and the timing of each traffic light adjusted accordingly. On the other hand, during the low periods, a vehicle-actuated control mode is employed – when the sensors detect that there are vehicles in one direction (and not in the others), the traffic light of that direction will automatically turn into green, while during the flat periods, there are also other modes and algorithms to optimize the waiting time of vehicles and pedestrians.[59]

[58] 'Tianjin starts the construction of smart streetlights + "new infrastructure" comprehensive demonstration zone', *Sina*, 22 June 2020, accessed 15 October 2022, <https://tech.sina.com.cn/roll/2020-06-22/doc-iirczymk8272148.shtml>.
[59] Huan L 2019, 'The CBD of Beijing builds Smart Traffic, big data intelligently regulates traffic lights', *China News*, 13 May, accessed 17 October 2022, <http://www.chinanews.com/sh/2019/05-13/8835431.shtml>.

Figure 2: A Smart Traffic Light[60]

Moreover, on both sides of the zebra crossings, there is a row of track spikes with inbuilt LED bulbs, the colour of which is consistent with traffic lights, and they will flash dramatically if a pedestrian runs a red light, to prompt him or her to return to the safety line and remind the vehicles to slow down. When crossing the road, the pedestrian will also hear voice prompts such as 'Green light. Please pass', 'Red light. Please wait behind the safety line', or 'You have run the red light. Please step back to the safety line'.

[60] Photo taken by the author in Hangzhou.

Figure 3: A Smart Crossing[61]

If you look carefully enough, you might also see that the vehicles driving on the road are also different to what they used to look like. Although their external appearance has not changed much, their interiors are radically different, equipped with various sensors, controllers, and actuators. Instead of self-driving automobiles, which are yet to be introduced on a large scale, I would like to focus on 'Smart Buses'. In the driver's cab of a Smart Bus, there is an 'Active Safety Prevention and Control System' installed, which monitors the status of both the driver and the vehicle. Specifically, the system will analyse the driver's behavior and identify whether there is any violation of the safety code such as fatigue driving, making phone calls, smoking, etc. If the driver misbehaves, it will warn him or her that certain act is inappropriate and will report it to the management system.[62] Every Smart Bus is also equipped with a vehicle-road coordination device which measures their speed and location in real time and enables them to connect with the traffic light control system. The device ensures the priority of public transportation at intersections, minimizing the waiting time of buses.

Moreover, at the front and back doors of the buses, there are cameras which constitute a passenger flow monitoring system. This system not only calculates the number of people getting on and off at each station but also analyses their movements. By combining the real-time data collected from different buses, the bus company can dynamically adjust the dispatch and schedule of each bus so as to provide

[61] Source: <http://cq.people.com.cn/n2/2021/0814/c367698-34867480.html>, accessed 17 October 2022.
[62] Xingdong, X 2021, 'Shenzhen launches bus active safety prevention and control system', *Guangming*, 9 April, accessed 17 October 2022, <https://m.gmw.cn/baijia/2021-04/09/1302219800.html>.

better services and reduce costs.[63] In addition, cameras and sensors are also used to detect other behaviours and actions of passengers, for example, whether they carry inflammable or explosive chemicals.[64] Therefore, Smart Public Transportation does not only mean that people can know the accurate time when the next bus will arrive through an app on our phones. The movements and behaviours of the drivers, passengers and vehicles are also being constantly monitored and controlled, accompanied with a continuous, real-time production of data.

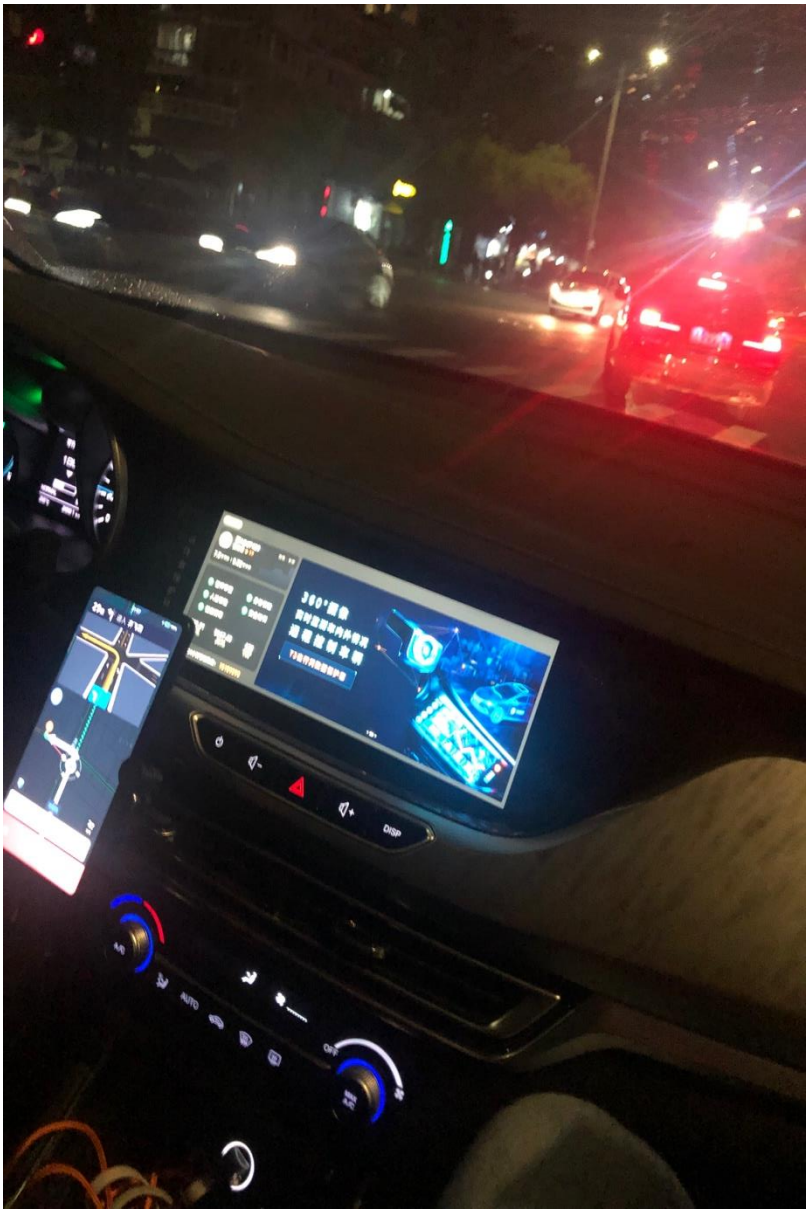

Figure 4: A Ride-hailing Monitoring System[65]

[63] 'Travelling smarter and more efficiently, big data facilitates Smart Transportation in Weihai', *People's Daily*, 1 February 2021, accessed 17 October 2022, <'https://wap.peopleapp.com/article/rmh18470449/rmh18470449>.
[64] Wei, Z 2021, '"Smart" public transport makes travel more convenient for citizens', *Guiyang Daily*, 10 May, accessed 17 October 2022, <https://guizhou.leju.com/news/2021-05-10/11446797365718049685322.shtml>.
[65] Photo taken by the author on a ride-hailing car at Hangzhou.

Similar technologies are employed for ride-hailing or ride-sharing.[66] Above is a picture I took when I was in a hail-car. In addition to the smart phone used to provide navigation, the screen behind it indicates that there are 360-degree cameras which monitors the environment within and without the car and the platform can remotely control the car so that they can use data to protect the security of the passengers. For example, for each journey the platform will design a best route and monitor whether the driver deviates from it without the consent of passengers. Furthermore, whenever using digital maps, no matter whether in ride-hailing or private cars, their movements will be recorded in real time and in turn influenced by the information (e.g., the recommended best route or the congestion levels of certain roads) provided by those maps and based on the data they collected.

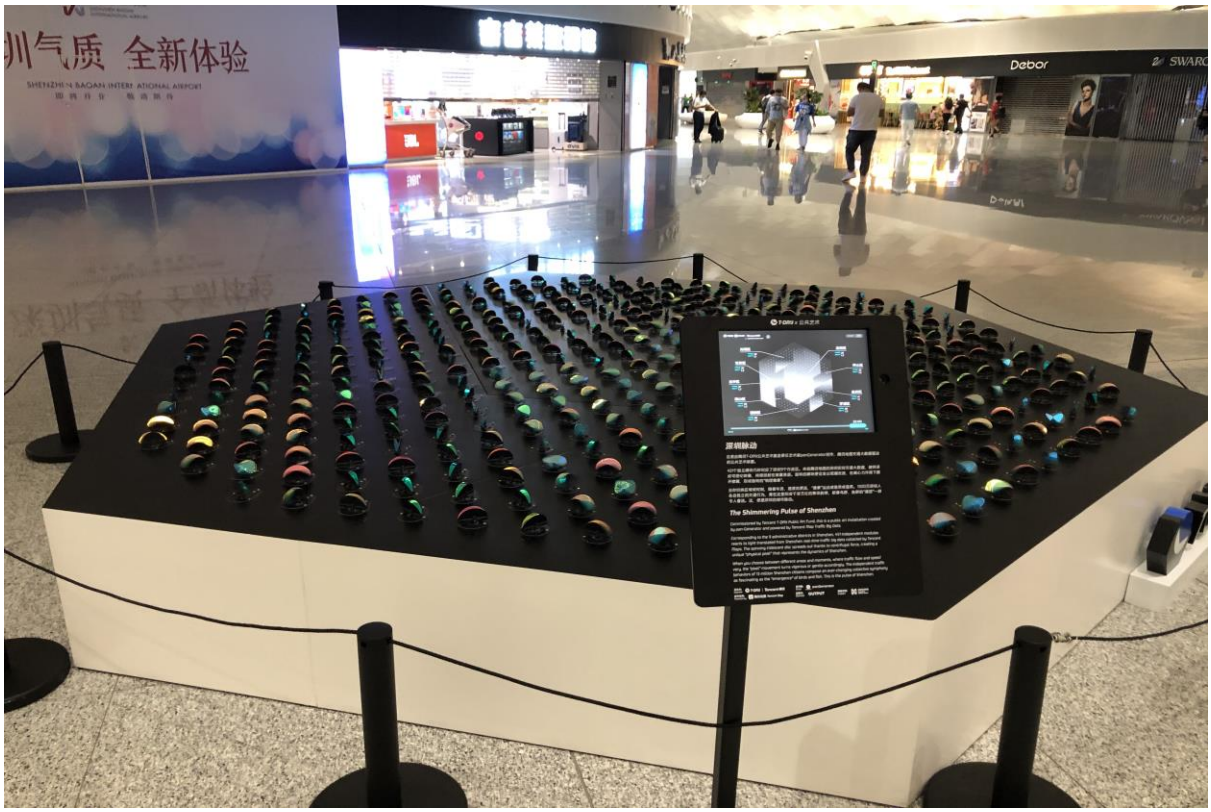

Figure 5: The Shimmering Pulse of the City[67]

A loop is thus created in which the movements of vehicles and people produce the flows of data, and these flows are then combined in ways that come to shape the former. Together the flows of vehicles, people and data constitute the pulse of the city. This could be well illustrated by an art installation 'The Shimmering Pulse of [the City]', which is created by panGenerator, a new media design and art group from Poland. In the introduction to their piece, they note:

Corresponding to the administrative districts in [the city], independent modules react to light translated from real-

[66] According to *The 50th Statistical Report on China's Internet Development*, as of July 2022, the number of online car-hailing users in China has reached 405 million. See: China Internet Network Information Centre 2022, *The 50th Statistical Report on China's Internet Development*, Beijing.
[67] Photo taken by the author at Baoan International Airport, Shenzhen.

time traffic big data collected by Tencent Maps. The spinning iridescent disc[s] spread out [because of] centrifugal force, creating a unique 'physical pixel' that represents the dynamics of [the city].

When you choose between different areas and moments, where traffic flow and speed vary, the 'pixel' movement turns vigorous or gentle accordingly. The independent traffic behaviors of [tens of] millions of citizens compose an ever-changing symphony as fascinating as the '[springing up]' of birds and fish. This is the impulse of [the city].[68]

This installation visualizes in a fascinating way the traffic big data and the varied intensity and speed of vehicle movements. Although it shows how big data could capture and represent movements, it nonetheless conceals how these movements are shaped, modulated or controlled by big data, or how the movements of vehicles and the flows of data are intertwined with each other. The point is not simply about, as Gabrys (2016, p. 244) suggests, 'coordinating flows of movement' to minimize stoppage, disruption, breakage, and jamming, but rather about algorithmic governance of these rhythms (Coletta and Kitchin, 2017) in which the stoppage and disruption of flows is also an important component of the rhythms of the city. I develop this point further in the case study of the Health Code in Section 4.3.

Figure 6: Smart Parking[69]

With the increase of vehicles, other than traffic congestion, the problem of parking has also become a big concern for vehicles owners as well as city and transportation management departments. The government has made great efforts to solve this problem; however, it is not enough to simply increase

[68] Quoted from the introduction on the interactive screen of this installation, with slight modification.
[69] Photo taken by the author in Hangzhou.

the number of parking lots, for there is spatial and temporal unevenness in terms of the usage of the parking lots. In certain areas or periods, the parking lots could be overcrowded, and it is almost impossible to find a place to park a car while in the others, the utilization rate of them could be quite low. It is in this case that big data techniques are used to address the parking problem.

The urban management department of the Flowing City designed an intelligent parking system with which most public parking lots are connected. Based on the utilization rate of each parking lot, the number of illegal parking in each area, the movement data of vehicles collected by, say, Tencent Map, and other data, the system will calculate the 'Parking Difficulty Index' for each area. Through an app, the drivers could check this index and search for vacant parking lots nearby.[70] This reduces the difficulty for drivers to find a parking lot on the one hand and improves the utilization efficiency of parking lots on the other. Local media comments that the development of Smart Parking makes parking lots flow. It is a rather interesting comment given that a parking spot is a place – how could it be movable? In this context, 'flow' means that parking lots, as a kind of resources, are being put into circulation, that their utilization rates are being increased. [71] However, what if the space could really flow? What if the space is not made of places but of flows? In a sense, the flows of data seem to make everything flow, even the space.

Moreover, the parking lots are becoming free of rods these days. Previously, at the entrance and exit of most parking lots were installed electronic lifting rods: After the drivers paid the parking fee, the rods would be lifted, and the cars could leave. However, now in many parking lots, these rods are removed, and license plate recognition systems are used. Under such systems, the cameras would automatically record the entering and exiting time of vehicles and the drivers could pay the fee online in advance or after they leave.[72] An implication of this change is that the parking lots are transformed from closed or semi-closed space into a wide, open field. This is a trend in the development of the Flowing City – (physical) boundaries are diminishing so that the flowing of humans, things, information, data, and capital is accelerated. It also reminds us of Deleuze's remarks on the 'unbounded' character of the 'society of control' in which bodies could move more freely while their position and movement are tracked all the time: 'what counts is not the barrier but the computer that tracks each person's position – licit or illicit – and effects a universal modulation' (Deleuze, 1992, p. 7). But we will also find in Section 4.3 that this imaginary of an open, free-flowing space could be broken such as during the pandemic.

[70] Tinglan, Z 2019, 'The City Brain solves "parking difficulty"', *Hangzhou Daily*, 8 March, accessed 17 October 2022, <http://www.hangzhou.gov.cn/art/2019/3/8/art_812262_30914490.html>.
[71] Feng, P 2020, 'Smart parking, lets the parking lots "flow", *Shenzhen Evening News*, 1 January, accessed 17 October 2022, <http://iyantian.sznews.com/content/2020-01/14/content_22775565.htm>
[72] 'Data-governing Hangzhou, the City Brain is more efficient', *Hangzhou Daily*, 30 December 2020, accessed 17 October 2022, <https://hzdaily.hangzhou.com.cn/hzrb/2020/12/30/article_detail_1_20201230T451.html>.

'For smart and secure neighbourhoods'

In the big data era, video surveillance is sometimes called Smart Video, Smart Security or Smart Policing, as I observed during the fieldwork. In the Flowing City, Smart Policing is increasingly looking like something we would see in a science-fiction film:

> The high-altitude camera installed opposite the city square provides a panoramic view of the streets a few kilometres away and sends the pictures back to the police station in real-time; a road patrol robot equipped with a 5G communication module can transmit real-time, high-definition patrol videos; patrolling police wear over-the-horizon equipment, and can communicate with the commander centre and transmit images in real time through an AR helmet; drones are also equipped with 5G communication modules and the commander centre could remotely control them to reach targeted locations, complete routed cruising, video tracking and other tasks, and send back real-time, high definition aerial pictures through the 5G network.[73]

Although these techniques seem to be quite high-tech and have not yet been widely used except in some areas, they are no more than a next stage of public security which has already relied on the urban environments abound with sensors and cameras. The only difference is that with big data and Internet of Things, surveillance and intervention could become more automatic, real-time and anticipatory: For example, in crowded regions such as subway stations and scenic areas, intelligent video analysis is employed to estimate the density, speed and walking direction of passengers and predict the trends of passenger flows in different areas, according to which the police dynamically adjusts on-site control and management strategies (e.g., the distribution of police force) to mitigate congestion.[74]

To enhance public security, smart technologies are not only employed in residential areas, especially in the practices of what is usually called 'Smart Neighborhood' (智慧小区). Here a neighborhood (小区), or a community, refers to a relatively independent, semi-closed residential area with a certain number of service facilities (e.g., shops, kindergartens, and fitness facilities), usually separated from other areas by walls and fences. In many Smart Neighborhoods, face and vehicle recognition systems are installed at the entrance. Only residents and vehicles registered could enter, as well as those who get the permission of the residents.

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[73] '5G new police innovative applications debut, Zhongshan's "smart public security" upgrades to version 2.0', *Nanfang Daily*, 12 September 2019, accessed 17 October 2022, <http://zfsg.gd.gov.cn/xxfb/dsdt/content/post_2601789.html>.
[74] Haozhe, Z & Yikan L 2018, 'In the new era, Shanghai starts the development of 'smart public security', *Xinhua Daily Telegraph*, 13 February, accessed 17 October 2022, <http://legal.people.com.cn/n1/2018/0213/c42510-29822122.html>.

Figure 7: A Facial Recognition Device at a Neighbourhood[75]

There are also other surveillance cameras and sensors distributed throughout the neighbourhood and connected to the police station nearby and the Smart Policing system. If a person unregistered has been present in the neighbourhood for many consecutive days, the system will remind the police to go to check his or her identity; on the other hand, if a registered resident – especially elderly people living alone – has not shown up for a period, the police will also receive a warning. The face recognition systems are also connected with residents' own smartphones. For example, when a child goes home, the parents will receive a message including a picture of their child and the time when he or she returns.[76] In addition, the neighbourhood also installs voice recognition devices in the corners: If someone is in danger and yells 'Help!', the cameras will immediately capture the images of what is going on and report to the police.[77]

It is not only the identity and movements of humans that are being monitored: If manhole covers are lost or moved, fire hydrants malfunction, or fire escape accesses are blocked, they all will be reported to the police or property management office. Every facility could be equipped with sensors and monitored in real time. As a local policeman remarked,

[75] Source: <http://www.zj.chinanews.com.cn/jzkzj/2020-02-12/detail-ifztrass1769951.shtml>, accessed 17 October 2022.
[76] 'Zhongshan solidly promotes the construction of "Smart Public Security", *Zhongshan Daily*, 26 August 2019, accessed 17 October 2022, <http://www.zsnews.cn/wz/index/view/cateid/41/id/620804.html>.
[77] Meng, L 2020, 'Smart Community – technology is very intimate, life is more comfortable', *People's Daily Overseas*, 13 October, accessed 17 October 2022, <http://www.gov.cn/xinwen/2020-10/13/content_5550804.htm>.

Real-time perception going deep into neighbourhoods and streets is like an invisible safety net. Once an abnormality occurs, the nearest police can be notified as soon as possible, to achieve a state of prevention and quickness, so that safety could be achieved in 'whole time and space'.[78]

This suggests two important characteristics, among others, of the development of smart city in China: First, security or safety concern lies in the heart of it; second, in order to enhance security, cities are becoming increasingly sentient, with the widespread and interconnected sensors and cameras. It is also worth noting that humans themselves have also become sensors and cameras in service of the smart city and public security. For example, the traffic police division designed a traffic violation report platform, on which citizens could report by taking photos or videos any traffic violation (e.g., vehicles occupying emergency lanes) or facility malfunction (e.g., broken traffic lights) they notice.[79]

In a sense, the Flowing City as a smart city is also a 'secure city'. It is densely populated and characteristic of hypermobility (of migrant workers, commodities, capital, information and so on), which its economic growth relies largely on, and which also impacts public security as well as raises and legitimates the concern about it. The development of big data and smart city provides new and more efficient means for monitoring and modulating the movements of humans and things and for enhancing public security. There is a need to reflect on the social and political costs for the security. But by no means an ideological critique such as the 'Big Brother is watching you' would be appropriate or sufficient for understanding the security complex constructed in the process of urbanization and digitalization.

When I was writing this section, I was living in a 'village in the city' (城中村), most residents of which were migrant workers and in which the mobility was extraordinarily high. Cameras were installed everywhere, even on each floor of each building. However, people did not express much concern about privacy but a lot of confidence about the security of the neighborhood and the whole society. For example, when talking about theft, people often said, 'Since there are cameras everywhere, it is no likely someone would come to your apartment and steal'. Others, such as Li (2018), calls this attitude towards technology 'pragmatic' that people are willing to trade privacy for security and convenience.[80] It, on the one hand, implies a kind of technological unconsciousness, but, on the other hand, we could also see that the sense of security is important for citizens, which is increasingly so during the post-epidemic period. This is similar to what Söderström (2021) observes for Cape Town:

Whereas the implementation of safety and surveillance technologies would be generally framed in the Global North by civil society organizations as raising questions of privacy and political freedom, civil society organizations in Cape Town, for instance, tend to see it primarily as a question of service delivery. (p. 402)

[78] Haozhe, Z & Yikan L 2018, 'In the new era, Shanghai starts the development of 'smart public security', *Xinhua Daily Telegraph*, 13 February, accessed 17 October 2022, <http://legal.people.com.cn/n1/2018/0213/c42510-29822122.html>.
[79] Bo, Z 2020, 'The whole people's 'taking a picture', not just a picture', 10 September, accessed 17 October 2022, <http://society.people.com.cn/n1/2020/0910/c428181-31856744.html>.
[80] Li, R 2018, *The whole speech of Robin Li on the annual meeting of China Development Forum 2018*, online video, accessed 24 October 2022, <https://v.qq.com/x/page/f0820kbeeg3.html>.

Instead of ideological or epistemological differences, he further argues that this should be understood in relation to the 'differences in which generic themes and processes related to smart cities are approached in the Global South and the Global North' (Söderström, 2021, p. 401-2). On the other hand, I think this could also be read from Stiegler's (2012) definition of technology as 'pharmakon', as both poison and cure: These technologies both raise questions of privacy and freedom and provide a sense of security.

As discussed in Section 3.3, there is a peculiar symphony between the ubiquity of digital devices and technologies, the indifference attitude of people towards them, and a sense of security and convenience brought by them. When discussing the possibility and form of ubiquitous computing in his 1991 text *The Computer for the 21st- Century*, Mark Weiser, a computer scientist and the father of ubiquitous computing, suggested that computing would be distributed in the fabric of everyday life and through the environments and thus become invisible (Weiser, 1991). Yet what is remarkable for the Flowing City is the ubiquitous visibility of digital devices and technologies – although computational operations might be invisible or inaccessible for users. It is this ubiquitous visibility, in which the power relations between the humans and technical objects operate rather than 'disappearing' into the environments, that I attempt to illustrate in this section. Moreover, rather than surveillance and privacy, my focus is on how everyday life, as well as the power relations, unfolds in the symphony mentioned above.

The smartness of Smart Neighbourhood is also shown in other aspects. For example, in the fitness areas, there are Smart Tracks: Residents could register their information at the start and end of the track; the cameras along the way would record their heart rates, micro-expressions and other data, which would be analysed to guide residents through exercise. Another example is Smart Bins. In order to develop a habit of garbage sorting among the residents, many neighbourhoods replaced old dustbins with new Smart Bins. Residents could open the bins via face recognition, scanning the QR Code or swiping IC cards, the bins would automatically weigh the garbage and transfer the weight into credits, and residents could use these credits to purchase things online. In addition, when a bin is full, it will notify the management staff in real time. [81] Kitchin (2021, p. 240, citing Vincent 2013) mentions that in London Smart Bins are used to track people through identifying the wifi connections of their smart phone. Rather than simply tracking people, these two examples introduced here show how residents and smart devices could interact with each other and how the latter could shape the former's behaviour, which are similar to the technologies used in the 'quantied self' movement (Lupton, 2016). But their influence is not as strong or extensive as another more common device, our smart phones. Among different digital devices, I think smart phones are the most important not only because people engage with them at any time any place. They are also the intermediary through which with we could engage

[81] Meng, L 2020, 'Smart Community – technology is very intimate, life is more comfortable', *People's Daily Overseas*, 13 October, accessed 17 October 2022, <http://www.gov.cn/xinwen/2020-10/13/content_5550804.htm>. Source of Figure 6 and 7: < https://36kr.com/p/1218497077907847>, accessed 17 October 2022.

with many other devices and technologies, digital or nondigital. Moreover, with more and more new apps and online platforms being developed, new possibilities and ways of life emerge one after another, which cannot be practiced without smart phones.

Figure 8: A Smart Track and A Smart Bin[82]

'For a digital and convenient society'

How convenient is it to live in the Flowing City especially with smart phones? Rather than just presenting some scientific data, I want to reflect on the lived experience of this purported 'convenience' by drawing on my ethnographic research. These facts might not be completely accurate, but they nonetheless showcase the perception and feeling of an ordinary citizen about the ways of living in a digitalizing society. In so doing, I attempt to present the 'microgeographies of everyday life' (Cresswell, 2011, p. 551) created by digital technologies and by the pictures attached, I want to highlight the ubquitous visibility of these technologies as ordinary and routinte aspects of daily urban life (Datta and Odendaal, 2019, p .387).

[82] Source: < https://36kr.com/p/1218497077907847>, accessed 17 October 2022.

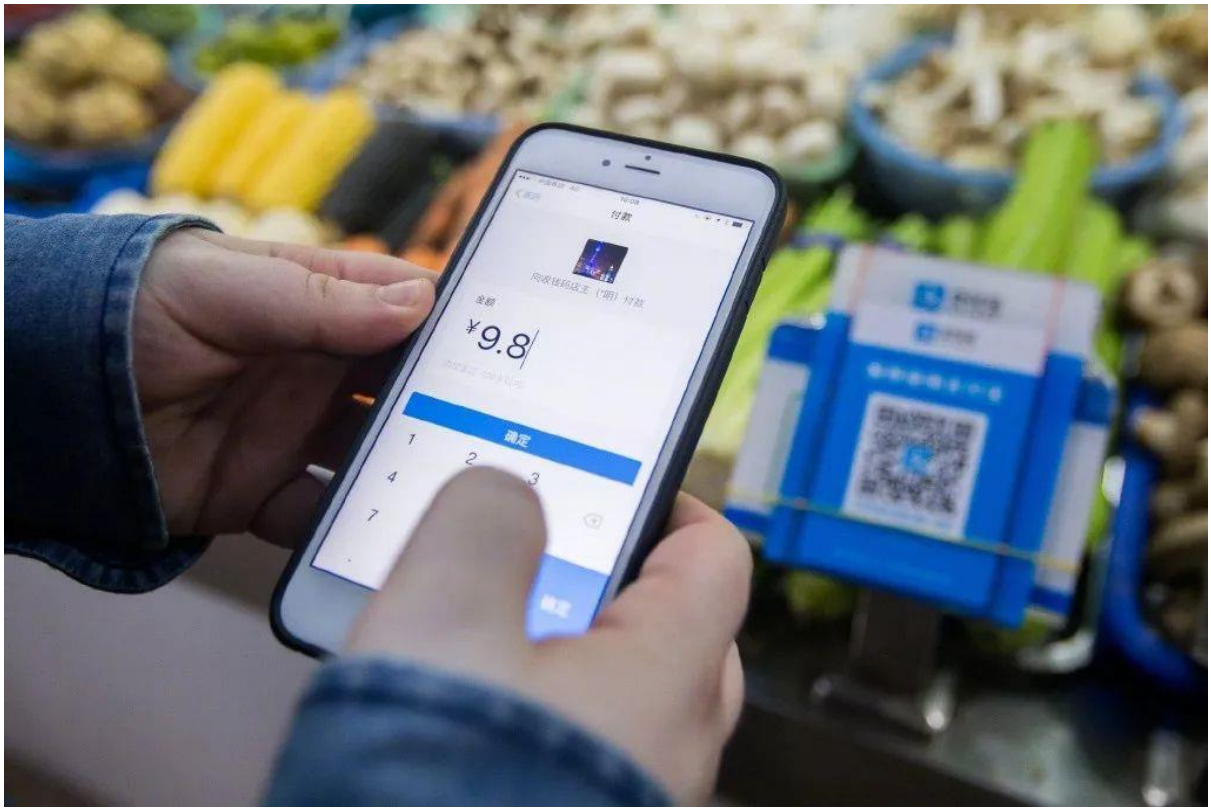

Figure 9: Scan to Pay[83]

[83] Source: < https://image.baidu.com/ >, accessed 17 October 2022.

As many other citizens, with the development of digital or online payment such as Alipay and WeChat Pay,[84] I cannot recall when the last time I used cash or bank cards was, as almost everything could be paid for via the smart phone. As shown by the pictures, Scanning the QR codes of the shops or restaurants and then entering the amount to be transferred, or letting them scan ours, has become the most common way for payment. It is the same when we take public transportation: We scan our payment code to purchase the ticket.

In similar ways, the QR codes are also used in other scenarios. In many restaurants, not only chains but also small, private ones, physical menus are not necessary, and we can just scan the code on the table and a digital menu will pop out on which we can order and pay for the food. This is also how we unlock a shared bicycle or e-bike, which is now available everywhere in the Flowing City.[85] Although these bicycles have to be parked in pre-delimited areas (within the white lines), since these areas are distributed through the city, we can easily ride shared bikes to travel across it or just to catch a bus or a subway.

[84] The *Annual Report of China's Payment Industry 2022* shows that by the end of 2021, the number of online payment users in China is estimated to be 904 million. See: China Payment and Clearing Association 2022, *Annual Report of China's Payment Industry*, 15 June.

[85] Take Changsha, a city in middle China, for example. As of November 2020, there are more than 600,000 shared bicycles (including 460,000 e-bikes) in this city. The density of shared bikes is about 1,380 per square kilometre, and the number owned by every 100 people is 7.1. See: 'Say goodbye to the "savage growth" – for Changsha's shared e-bikes, how to ride them in the next stage', *Hunan Daily*, 30 November 2020, accessed 17 October 2022, <https://baijiahao.baidu.com/s?id=1684764106243797994&wfr=spider&for=pc>.

Figure 10: Shared Bikes[86]

Not to mention, online shopping is very fast and convenient in the Flowing City. I purchase almost everything, whether groceries or services, on online shopping platforms such as Taobao and JD. It usually takes only three days for an order to be delivered. If you purchase the goods sold by these platforms themselves, they could even be delivered in the same day (even within one hour) or the next day.[87] Food delivery is also very convenient. From my own experience, we can usually get the food delivered in about 30 minutes or one hour if the weather is bad. Until the food is delivered, the users can check through the app the real-time location of the deliver and how long it might take for her to arrive. And when the deliver arrives, he or she could put the food in the Smart Food Delivery Lockers and people can get their food after scanning the QR codes on them.

[86] Source: <https://new.qq.com/rain/a/20210922a0465y00>.
[87] This is largely attributed to their Smart Supply Chain systems which in advance predict the demands of different goods in different regions and times and optimize the inventory in their warehouses throughout the country. After an order is placed, the goods will be delivered from a nearest warehouse to the destination.

Figure 11: Smart Food Delivery Lockers[88]

It seems that we can do everything with smart phones. If there is anything more convenient than this, it must be that we can do these things even without the phones. Below is a picture of a facial recognition payment device I took in a small, private convenience store. What astonished me when I was in the Flowing City was the prevalence of facial recognition payment devices, which could be seen everywhere, whether in a supermarket located in a large shopping centre, a small street shop, or a vending machine. I used these devices quite a few times when my phone was powered off or out of curiosity. To check out, I did not even need to take out my phone and scan the QR code of the shops; instead, I just needed to scan my face (through the cameras on the devices), type the last four digits of my phone number (not necessary every time), and then finish the payment.

[88] Photo taken by the author in Hangzhou.

Figure 12: A Facial Recognition Payment Device[89]

But are these devices and technologies, as well as the ways of life they enable and represent, as convenient as they appear to be? Do they not at the same time create many unnecessary steps and ways of life especially for people who are not familiar or comfortable with digital and smart technologies? By 'ways of life', I am referring to Foucault's usage of it, who understands this concept in terms of 'how power emerges and operates within ways of life' as well as how alternative ways of life are possible (Gabrys, 2014, p. 36). Here my focus is not on digital literacy or digital inclusion and exclusion (Mouton and Burns, 2021). Rather, I argue that there are 'glitches' (Leszczynski and Elwood, 2022) of these digital and convenient ways of life. First, these ways of life rely not only on digital technologies but also the hypermobility of humans, vehicles, commodities, and capital – such as in food delivery. As shown by the outbreak of the Covid-19, if this hypermobility is disrupted, many smart and convenient ways of life are disrupted and no longer sustainable. Second, those digital technologies designed to bring convenience could also turn to be unnecessary or undesirable, of which the Health Code is a typical example as during the pandemic, people need to present their Health Code every time they go to public places. Third, the development of smart city requires and attempts to produce a certain kind of 'ideal' citizenship or subjectivity which is 'prefigured as tech-savvy, independent, and uber-modern' (Burns and Andrucki, 2021, p. 12), that is, able to use expertly various kinds of digital technologies and adopt the ways of life created by them. But, as Gabrys (2016, p. 207-38) notes, this production of smart

[89] Photo taken by the author's sister in Hangzhou.

citizenship is not always successful, which leaves open the possibility to challenge those digital ways of life and the power relations implied in them.

In relation of these everyday activities, privacy could be a major concern (Graham and Shelton, 2013, p. 258, Tene and Polonetsky, 2011, Jain et al., 2016), but I think a more important problem is to see through them how data and the processes of digitalization and datafication produce the urban space and everyday life. They together suggest the emergence of certain new kinds of subjectivities as implied by these ways of life, as they illustrate what it means or looks like to be a (digital) citizen in a digitalizing society. On the other hand, as digital technologies increasingly become a part of our life and our body, we also become the component parts of them not only as individuated subjects but also 'dividuals' (Lazzarato, 2014). Our movement, actions, body (e.g., hands and face), and affection are operationalised for the functioning of these technologies. Each device, connected with larger networks, creates a socio-technical milieu, in which a certain way of life (and of the governing of life) is possible and this device, data, humans, and other nonhuman agents constitutes a socio-technical machine which modulates the subjectivity and mobility of both human and nonhuman agents. These activities such as scanning QR codes present 'a predictability of routine' in which they become 'mundane and banal, and therefore unspectacular and depoliticise', yet this routineness and banality is fundamental to the power relations embedded and embodied in everyday life (Datta and Odendaal, 2019, p. 338) and to the production the human body and subjectivity.

'For a more digital future'

I want to finish this city tour with a last example, the Digital RMB, which I think is one of the most important developments in the emerging smart society. For what can better represent a smart society than the digitalization and datafication of capital. Digital RMB is the digital currency issued by the People's Bank of China, which is sometimes called 'DC/EP' (Digital Currency and Electronic Payment). Although it has not been widely used, many cities have started to explore the possibility of it. Digital RMB has the same properties and functions with cashes. It adopts a two-tier operating system: The People's Bank of China first distributes them to state-owned banks and other financial institutes including online payment service providers, and then the second-tier organizations could transfer them to the public. To use it, one must install an app of 'Digital RMB' on the smartphone and apply for a 'personal digital wallet'.[90] With this wallet, one can finish a payment even without the internet, as more and more smartphones are equipped with the NFC (near-field communication) function.

Since the end of 2019, the Digital RMB has been put into trial use in Shenzhen, Suzhou, Xiongan,

[90] Yingying, X 2021, 'Interpretation of the digital RMB: What is its difference from Alipay and WeChat?', *Tencent News*, 23 February, accessed 19 October 2022, <https://new.qq.com/omn/20210223/20210223A0FB5500.htmlL>.

Chengdu and the 2022 Winter Olympics.[91] At present, Digital RMB could be used in many places, such as supermarkets, shopping malls, restaurants, and food markets.[92] In May 2021, an online payment provider, MyBank (Alipay), became one of the operating institutions of digital RMB and started to experiment with integrating the Digital RMB into its own platform/app. This implies that the application scenarios of Digital RMB have been being extended from in-store to online shopping and payment and that because of the popularity of Alipay, we could 'see' Digital RMB everywhere in the near future. It should be noted that the major difference between Digital RMB and Alipay or Wechat Pay is that while the former is a form of the currency, the latter is only a kind of online payment method or a wallet.[93]

With the development of digital RMB, there is a concern that the flow of cash and capital as well as the consumption behaviours of individuals will be easier to record and trace so that the privacy risk will increase. However, the case is more complicated in practice. In online shopping, Digital RMB is not directly paid to the sellers but anonymized and sent in the form of 'sub-wallets'. Specifically, the payment information will be packed and encrypted in sub-wallets, and then 'pushed' (推送) or delivered to the online shopping platforms. Therefore, the platforms could not obtain personal information as they do nowadays. For in-store shopping or transfers between individuals, the transactions are also anonymized so that personal privacy could be ensured.[94] But the information is transparent to the government, which would be utilized to 'prevent illegal activities, such as money laundering, counterfeiting, illegal financing and tax evasion' as well as improve monetary policies and economic planning.[95] The emergence of Digital RMB indicates that there will be continuous, real-time production of data accompanying the issuing and circulation of the currency which will be in turn modulated by the data. As Sadowski and Bendor (2019) suggest, 'The smart city is a dynamic future-in-the-making' (p. 541). From such processes of datafication, we might get a glimpse of the present and future of a digitalizing society of China.

Section 4.2 The City Brain

Despite the way in which I assemble them, the digital technologies and devices introduced in the last section, as well the ways of life and urban management practices they enable, are not orchestrated and

[91] Central Commission for Discipline Inspection of CCP and State Supervision Commission of China 2021, 'Digital RMB: overtaking on bends', 30 December, accessed 19 October 2022, < https://www.ccdi.gov.cn/yaowenn/202112/t20211230_160996.html>.
[92] 'Can also be used for grocery shopping! Digital RMB "flies into the homes of ordinary people"', *Xinhua Net*, 11 May 2021, accessed 19 October 2022, <http://www.xinhuanet.com/info/2021-05/12/c_139940086.htm>.
[93] 'Digital RMB is connected to Alipay, and MyBank becomes the seventh commercial bank to participate in the public test', *Shenzhen Commercial*, 10 May 2021, accessed 19 October 2022, <https://finance.sina.com.cn/blockchain/roll/2021-05-10/doc-ikmxzfmm1569838.shtml>.
[94] 'Afraid of the "digital footprints"' being exposed? How does the Digital RMB protect our privacy and security?', *Xinhua Net*, 29 March 2021, accessed 19 October 2022, <https://www.cebnet.com.cn/20210329/102740283.html>.
[95] 'Why is China moving to digital RMB?', *CGTN*, 12 December 2020, accessed 19 October 2022, <https://news.cgtn.com/news/2020-12-12/Why-is-China-moving-to-digital-RMB--W3n61i8Wvm/index.html>.

organized in advance but emerge and develop one by one although not independently. Their distribution within and throughout the urban environments indicates a mode of decentralized, distributed governance (Gabrys, 2014). At the same time, in the development of smart city, there is also a trend to integrate and manage these devices and activities together, which is exemplified by what is called the 'City Brain' (Zhang et al., 2019). Moreover, in the previous section, by characterising a smart city as a flowing city, I argue that within and across various mobile or immobile urban infrastructures and digital devices, there are constant flows of data which are produced by and in turn modulate the flows of both human and others nonhuman agents, as well as people's everyday life, and turn the urban space into not merely 'space of flows' (Castells, 2010) but, in Coletta and Kitchin's (2017) terminology, 'space of algorhytms (i.e., algorithmically made rhythms)'. While these flows or rhythms seem to be distributed and un-orchestrated, the City Brain, by defining the city as a body in a neurological way, represents an effort to coordinate and synchronize them by making these flows, especially the flows of data, into the 'nerve impulses' of it. However, I argue that these two modes of governance, distributed and centralized, do not contradict but coexist with each other in the development of smart city.

To start with, I want to first give a definition of the City Brain. A City Brain is a project, a platform, and a city management centre, wherein a mass of data of different types, forms, and quality and with different sources is integrated, processed, and analysed together, and the staff from different government departments are brought together to deal cooperatively with the issues in both daily and emergency management. It monitors and controls the operation of a whole city, covering as many different fields as public transportation, urban management, health, grassroots governance and so on. It is also what makes the city think by itself. With its remarkable data processing and calculating capacities, it has been transforming the city into a self-thinking machine or better still, an intelligent being. Others, such as Ye (2021), calls it a 'city-being'.[96] In this section, I discuss the (hierarchical and organic) form and structure of the City Brain and the mode of urban management with it, and address this following question: How does it reshape our understanding of the city and the governance of it?

The Cyborg City

As shown by its name, Feng et al. (2018) suggests that the City Brain presents a structure similar to the human brain, with the Internet of Things (and humans) constituting its somatosensory nervous system and motor nervous system; cloud computing the central nervous system; mobile internet the nerve fibres; Big Social Networks (Big SNS) connecting together all humans and things the neural network; and artificial intelligence (AI) the soul. In fact, AI technologies are not only used in the central nervous

[96] Ye, L 2020, '"Intelligent living beings": where are cities going?', 11 June, accessed 9 November 2022, < https://mp.weixin.qq.com/s/pE_2oZ15TWIjvC6RmK7sJw>.

system, but increasingly incorporated into the sensors and other nerve endings, which is called 'edge computing', so that they also can 'think' by themselves (Feng et al., 2018). This suggests to some extent that the City Brain is both a centralized and decentralized system. Moreover, different sensors, nerve fibres and centres, and effectors together constitute the cloud reflex arcs of the City Brain, which Feng et al. (2018) defines as 'a complete intelligent reaction chain required for the operation of a city' (p. 627). Like the reflex arcs of humans, the cloud reflex arcs are fundamental to the reflex activities – the circuits formed between the moments when an event occurs and is sensed, and when reactions are given and problems are solved – happening in the city. This Through these systems, the City Brain can sense, think, make decisions, and even act by itself. In this sense, the City Brain makes a city into a cyborg, which is both a technical system and an organism.

This can be further illustrated by a special component of the City Brain, the 'digital cockpit'. A cockpit is the part of a vehicle where the driver sits, but it has different meanings in this context: Sometimes it refers to the city operation and management centre in its entirety[97] while in most cases, the different online platforms of city management designed for different scenarios. [98] As Wangjian, the chief architect of Hangzhou City Brain, explains,

> In the past, many departments and enterprises collected data and displayed it on a big screen for others to see; with the digital cockpits, the data presented on the big screen can be used by the departments and the enterprises themselves, through analysis and calculation, to assist decision making. As a result, the big screen 'becomes' the cockpit.[99]

It is suggested that sitting in a cockpit, physical or digital, the city administrators could have within their vision the real-time data and images of what is happening across the city, and thus identify problems and give commands. However, its function is not as interesting as its name: the cockpit of the City Brain. This shows a strange combination of the organism and the machine, not only in terms of the terminology but also the intention of information technology engineers or city administrators to use digital technologies and devices to 'vitalize' the city.

The reason why they call the city management centre and platform 'City Brain' is not only because it could sense, think, and make decisions in a way that mimics the human brain. There is also another implication of this term: With the City Brain, a city becomes an organism which is hierarchical, centred, and self-regulated. As Wangjian puts it, 'to understand the City Brain, first of all, we must regard the city as a complete, living body, because only a complete, living body could have a brain. The most

[97] Yu, L 2021, 'The "cockpit" of the City Brain of Haidian, Beijing is launched, and urban governance has entered the era of intelligentization', *Beijing Daily*, 22 January, accessed 9 November 2022, <https://news.bjd.com.cn/tech/2021/01/22/44715t133.html>.
[98] Hangzhou City Brain Co., LTD 2022, *Products of Hangzhou City Brain Co., LTD website*, accessed 9 November 2022, <https://www.cityos.com/product>.
[99] Tang, J 2019, 'The digital cockpit of the City Brain is launched, and Wang Jian's interpretation: bringing three major changes', 30 September, accessed 9 November 2022, <https://zj.zjol.com.cn/news.html?id=129961>.

important function of a brain is to coordinate'.[100] Feng et al. (2018) further suggest that the construction of the City Brain facilitates 'the organic integration of all components of a city' (p. 625). Take the cloud reflex arcs and reflex activities for example. Although the reflex activities of humans do not need the participation of consciousness, those of the City Brain nonetheless require the effort of both artificial intelligence and human intelligence, in which different agents (i.e., sensors, cameras, smart devices, humans, etc.) are deployed and combined to promote rapid and 'smart' responses for city management.

In another sense, to coordinate also means to hierarchize and regulate. A City Brain is a hierarchical system. Besides the central system at the city level, there are also many sub-brains across different administrative levels (e.g., districts, subdistricts, and communities). For example, in Pudong, there are 39 subdistrict operation platforms and 1370 urban or rural community platforms, which are all connected to and share data with the City Brain. If there is an emergency, the City Brain could communicate with these sub-brains and directly command and dispatch subdistrict or community urban management staff to address it. These sub-brains, on the one hand, have their own jurisdiction (and only have access to the data within their jurisdiction) and on the other, act as the extension of the City Brain and thus extend its power to control the whole city.[101]

Above all, more than an assemblage of infrastructures, buildings, technical devices, people, administrative regions, and so on, the city has become an organic whole. This is not simply a parallelism or isomorphism between the city and the human body, but the becoming-organism of the city.[102] Recall Deleuze and Guattari's conception of the organism discussed in Section 2.1. As Smith (2018, p. 107) explains, for them, the organism should be considered as a certain formation which restricts the body's capacities and potentialities. The brain-like architecture of smart city makes a city intelligent, able to sense and think. But also constrains its ability to produce something new when the City Brain strives to keep everything in order using big data techniques and other tools and through certain regulations and protocols, such as closed loop management, in which the happening and reporting of an event, the reaction to it, and the recording of the result must form a closed loop. That is not to say that these techniques and the use and application of them are not innovative, but rather that the city, with itself becoming a kind of organism, might be losing the ability to provide creative, vigorous life to the citizens, both human and nonhuman agents.

On the other hand, Smith remarks that a body constructed as an organism could become a machine again:

A body may be structured like an organism, but, since its organs are all machines, it will always retain the capacity

[100] Wang, Y 2020, 'Wang Jian, an academician of the Chinese Academy of Engineering: City Brain is China's innovation', 18 May, accessed 10 November, <http://www.cae.cn/cae/html/main/col35/2020-05/18/20200518162013449244702_1.html>.
[101] Wang, J 2020, 'Pudong's "City Brain" promotes refined management to extend to "nerve endings"', *Eastday*, 4 November, accessed 9 November 2022, < https://j.eastday.com/p/1604478789023425 >.
[102] On the other hand, we could also consider the development of City Brains as a process towards the individuation or trans-individuation of cities. In terms of trans-individuation, as Feng et al. (2018) observe, 'a city's cloud computing hardware facility is likely located in another city, and a city's big data may be distributed and stored in different cities' (p. 2).

to ‘disarticulate’, as they put it, to cease to be an organism.

He further explains that becoming-machine means ‘one part of the body enters into combination with some other machine in a way which allows it to escape from the regularizing, normalizing processes’. A machine is a socio-technical assemblage in which connection and disconnection happen and which is ‘opened up to a whole host of new connections, each of which may lead to the production of an event’ (Smith, 2018, p .109). In the context of smart city, it implies that there are the possibilities that human and nonhuman agents could connect and communicate with each other through or not through digital technologies, while not subject to certain regularizing forces. The City Brain, or other digital technologies, could be a platform for such connection and communication instead of regulation. This is how I understand the City Brain as a cyborg, as both an organism and a machine, not only in terms of its structure and form.

Towards refined management

To further the discussion on how the City Brain reshapes the understanding of the city and city governance, I now turn to its roles and functions in relation/the context of ‘refined management’. A City Brain, first of all, is a data management platform which integrates the data collected from different government departments and enterprises as well as that generated by various sensors and cameras. The construction of City Brains provides an approach to overcome the institutional and technological barriers in data sharing between departments, regions, and industries, which are often called ‘isolated data islands’ (数据孤岛) or ‘information silos’ (信息烟囱). For example, in Hangzhou, it is reported that previously there were 760 information systems built by 52 government departments and agencies and their data were isolated from each other; however, after the construction of a City Brain, it has collected about 83.7 billion pieces of data from different sources by 2019 and this number is ever-growing.[103] Moreover, as the City Brain connects with a great many sensors and cameras distributed throughout the city and also connects them to each other, there are continuous streams of data generated in real-time flowing in and out of it. In Pudong District, Shanghai, for instance, its City Brain connects with about 3.08 million electricity, water and gas meters and 40 thousand other IoT sensing devices as well as well a number of cameras set by public security and transportation departments.[104] By integrating the data together, the City Brain could have deep and nearly full comprehension of the dynamics of the city, and facilitate more real-time, data-intensive decision-making for urban management and thus increase the value and utilization efficiency of data.

Therefore, in addition to a data centre, a City Brain is also a management centre, which is why it is

[103] Weiqiang, C 2019, ‘The practices of and thoughts on the City Brain’, *CCP NEWS*, 8 September, accessed 21 October 2022, <http://theory.people.com.cn/n1/2019/0908/c40531-31342597.html>.
[104] Wen, Z 2018, ‘Xi Jinping: governing a city like embroidery’, *CCTV*, 11 November, accessed 21 October 2022, < https://m.yicai.com/news/100056965.html >.

sometimes named ‘city operation and general management centre’ such as in Pudong. The construction of City Brains aims to realize the ‘refined management’ of cities. Here ‘refined’ means precise, accurate, scientific, specific, and targeted. Below is a picture of the gate of the Pudong City Operation & General Management Centre. On the top of the gate, there is a sentence in both Chinese and English, which says, ‘City management should be as fine as embroidery’. In other words, city management should be like making fine, delicate artwork: The administrators should be as careful and elaborative as possible; they should have a full picture of what is going on in the city and at the same time, give different responses to different events, swiftly and precisely; and they do not have to do so by themselves but with the facilitation of big data techniques. To put it differently, compared with traditional modes, refined management in the big data era relies on human-computer interactions, on data analysis rather than personal judgement, and on active discovering of problems instead of passive responding.[105]

Figure 13: Pudong City Operation & General Management Centre[106]

There are several requirements of refined management. First, refined management requires the global perception and sensing of the city both in terms of space and time, that is, 24/7 monitoring of what is happening in every area, which could be acquired through the ubiquitous sensors and cameras. It is suggested that the construction of the City Brain is a practice of ‘all-pervasive government’ or ‘seamless

[105] Ming, J & Lin, Z 2020, ‘Refined city governance, Shanghai’s “one network management” enhances the city’s ‘intelligent governance”’, 8 June, accessed 21 October 2022, <http://www.xinhuanet.com/politics/2020-06/08/c_1126088136.htm>.
[106] Source: <http://www.xinhuanet.com/politics/2020-06/08/c_1126088136.htm>, accessed 21 October 2022.

government' (无缝隙政府). In some cases, even when a small piece of paper, say, with the size of a palm is littered on the ground, instead of being put into a dustbin, it will be captured and reported to the City Brain. Moreover, every important infrastructure, facility, building, and place is digitalized and datafied. Take Shanghai again for example:

> 14.95 million urban units such as streetlights and fire hydrants, 26,800 kilometres of underground pipelines, more than 5,000 construction sites, more than 14,000 residential neighbourhoods, over 3,000 historical buildings…. It took two years for Shanghai to move these indispensable 'objects' for city operation onto the 'digital map'. [107]

These objects and places are not merely projected onto a digital map but equipped with sensors which record their changes or 'lives' in real time and reflect these changes dynamically on the map. In addition, on a city management platform, there would be many different maps with different elements and designed for different scenarios. For example, in the scenario of garbage sorting, there would be elements such as dustbins, transfer stations, disposal sites and so on. These maps would be employed separately or integrally according to scenarios or purposes. Usually, in a city management centre, there would be a large screen (or screens) which present these dynamic maps and the real-time images of important places.

Figure 14: Hangzhou City Brain[108]

[107] Ming, J & Lin, Z 2020, 'Refined city governance, Shanghai's "one network management" enhances the city's 'intelligent governance"', 8 June, accessed 21 October 2022, <http://www.xinhuanet.com/politics/2020-06/08/c_1126088136.htm>.
[108] Source: <https://www.shobserver.com/news/detail?id=90781>, accessed 9 August 2022.

This is called sometimes as 'viewing a whole city via one screen' ('一屏观全城').[109] This screen is not only an instrument for data visualization but the embodiment of the datafication of a city. It represents a 'digital twin' of the city (on the concept of 'digital twin' see, for example, Batty 2018). Not only are infrastructures digitalized and datafied but also the city in its entirety. Every change in the city will be reflected in its digital twin. Moreover, the digital twin can also be employed to simulate and predict the dynamics of events or even long-term evolution of cities. For example, when there is a traffic accident happening on a bridge, the City Brain can perceive it immediately, simulate its influence on the traffic under different scenarios and figure out an optimal strategy about, for example, whether to block the bridge for a short time or keep it open.[110] In this case, a city and its digital twin interact and co-evolve with each other.

Secondly, refined management also requires that an event or a problem will be detected and addressed immediately as soon as it happens. This is especially evident in the 'grid management' (网格化管理) as a specific mode of refined management:

> Urban grid management is a mode of digital city management. It uses geocoding technology, network map technology, and modern communication technology to divide different streets and communities into several grids, digitize components and events, and at the same time, connect the component and event management with the grid units to form a multi-dimensional information system. Once a problem is found, it can be transmitted to the command platform in time, and the corresponding functional department can be notified to solve the problem, so as to realize the seamless management of urban management space and time.[111]

Equipped with sensors and cameras, infrastructures, facilities and other city components can monitor the events and activities happening within their milieu as well as the performance and condition of themselves. As soon as a problem occurs, it will be automatically reported to the City Brain which would figure out counter measures or response strategies, or at least provide statistical analyses to aid decision-making. At first glance, it would seem that in the big data era, the role of humans is less and less important in urban management.

However, although the generating, collecting, streaming, processing, and analysing of data is more and more automatic, there requires even more, rather than less, human efforts for information collecting, hazard identifying, decision-making, problem-solving, and so on. An example might help us further understand how the refined management requires the cooperation of humans and digital technologies:

> When an intelligent video sensing device (i.e., a Smart Camera) detected a supermarket piling up goods beyond its door (and thus blocking the road), it automatically 'pushed' the information to the City Brain, and then the management office quickly screened the video and confirmed the violation. Through the platform they sent an SMS message to the manager of the supermarket requesting immediate rectification and at the same time, 'pushed' the enforcement order to the mobile terminals of the corresponding urban management team. When the team

[109] Haifeng, C 2021, 'Tianjin's "city brain" makes urban governance "smarter"', *China News*, 12 May, accessed 21 October 2022, <http://www.chinanews.com/cj/2021/05-12/9475989.shtml>.
[110] Yunshan, Z 2020, 'City Brain 3.0 released the core technology for the first time, which can deduce the future of the city in real time and can also serve as an intelligent advisor for city decision-making', Qianjiang Evening News, 18 September, accessed 21 October 2022, <https://www.thehour.cn/news/399537.html>.
[111] http://www.sx.chinanews.com/news/2010/1227/30490.html.

arrived, the supermarket manager said he had received the message and was moving the goods inside.[112]

In this case, both humans and digital technologies are important components of the cloud reflex arcs of the City Brain.

This could be further illustrated by the fact that the urban management staff themselves are also digitalised and datafied. Through the mobile terminals with which they are equipped, their movements and actions are tracked and recorded, and thus become measurable and controllable:

> Take the dense blue dots on a map of Pudong on the big screen of the Pudong City Operation & General Management Centre for example. Each dot represents the location of one or several of the on-site management staff … Through a handheld mobile device, they can communicate with the City Brain at any time, giving feedback via a single button; at the same time, the commander at the centre could make a video call with anyone, checking their movements, tasks, and processing results.[113]

In other words, they do not only respond to the data which indicates some problem or anomaly occurring in the operation of the city but also participate in the continuous production of data which in turn conditions their movements and actions. In these processes, they are 'enslaved' in the City Brain as a socio-techno-datalogical machine as both individuated subjects and 'dividuals' (Lazzarato, 2014). Apart from people and objects, such as the goods placed outside and the supermarket manager in the above example, they have also to deal with data, to make it look nice or right. Otherwise, the data would 'betray' them, for example, when they do not patrol a certain area according to a pre-set route or fail to handle a problem according to certain procedures. Therefore, instead of the replacement of humans with digital technologies, the development of smart city is based on better appropriation and employment of human labour and intelligence, as well as other elements of human subjectivity.

Thirdly, refined management implies that personalized services are provided to citizens, households and communities. For example, in Shanghai, many communities have set up special canteens which provide cheap, healthy food for elderly people who satisfy certain requirements such as the inability to cook. It was reported that there was a couple, who were both over 70 years old and had difficulty in walking, living in a community which did not have such a canteen. Therefore, they contacted the corresponding department, which retrieved their household profile from the city management platform, confirmed that they met the standards of food assistance, and helped arrange food delivery specifically for them.[114] This simple story reveals an important trend in the development of urban management. Instead of formulating and employing general, widely applicable policies, urban management is becoming personalized and individualized. In this example, household profiles are used to describe the characteristics of households and provide references for targeted management. It is data and the

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[112] Xiaojing G & Sha Z 2020, 'Pudong's "City Brain": A study sample for Chongqing's construction of Famous Smart City', 18 December, accessed 21 October 2022, <http://cq.people.com.cn/n2/2020/1218/c365402-34480806.html>.
[113] 'Pudong's city operation and general management centre: "City Brain" constantly and iteratively updated', *Jiefang Daily*, 1 November 2019, accessed 21 October 2022, <http://rsj.sh.gov.cn/tpd_17091/20200616/t0035_1367554.html>.
[114] Ming, J & Lin, Z 2020, 'Refined city governance, Shanghai's "one network management" enhances the city's 'intelligent governance"', 8 June, accessed 21 October 2022, <http://www.xinhuanet.com/politics/2020-06/08/c_1126088136.htm>.

subjectivity produced through data that determine whether they can enjoy certain kinds of services, as this couple was identified as qualified for food assistance not because they were both over 70 years old or having difficulty in walking but only when this information was registered and confirmed by data.

As a city management centre, and for the purpose of refined management, the City Brain incorporates a number of different functions of different government departments, such as urban management, public security, emergency management, water, housing and urban-rural development, education, health, industry and information technology, personnel, government services, etc.[115] This is conducted by transferring a certain number of staff from these corresponding departments to the City Brain, who still belong to their original department and have corresponding jurisdiction. Among others, there are two reasons for such integration: For one thing, if a situation is related to a certain department, the staff from that department could be present in time, whether to give commands within the City Brain or address problems on the spot; for another, it facilitates the cooperation between departments especially when the situation requires joint efforts.

It is not only staff but also the management systems/platforms of these departments are integrated together. For example, by the end of 2019, the City Brain of Hangzhou had established and incorporated 11 systems and 48 application scenarios in public transportation, urban management, public health, grassroots governance and so on.[116] The purpose of integrating the data, functions and management platforms of different departments is to achieve 'governing through one network' (一网统管). Here 'network' refers to the physical and digital infrastructures that constitute a City Brain or other digital government systems, including the Internet, cloud services, big data centres and platforms, as well as 5G and Internet of Things. It means using one integrated network or system to perceive and monitor the whole city and its dynamics, make decisions, command and dispatch, coordinate and govern.[117] Simply put, a network, a platform or a centre 'knows' everything and 'manages' everything.

Revisiting the Panopticon

In this case, the City Brain cannot help but remind one of the Bentham's Panopticon such as described by Foucoult (1975)

> [A]t the periphery, an annular building; at the center, a tower; this tower is pierced with wide windows that open onto the inner side of the ring; the peripheric building is divided into cells, each of which extends the whole width of the building […] one can observe from the tower, standing out precisely against the light, the small captive

[115] Government of Shenzhen 2020, 'Longgang's "City Brain" makes urban governance as delicate as embroidery', 10 October, accessed 21 October 2022, < http://www.sz.gov.cn/szzt2010/jjhlwzwfw/cgzs/content/post_8166796.html>.
[116] Chuangze 2020, '48 application scenarios of Hangzhou City Brain', *Hangzhou Magazine*, 19 July, accessed 21 October 2022, <http://www.chuangze.cn/third_1.asp?txtid=2060>.
[117] Xiao, W 2021, 'Guangdong takes the lead in exploring "digital government", provincial governance achieves "one network unified management"', *Southern Daily*, 19 April, accessed 21 October 2022, <http://gd.people.com.cn/n2/2021/0419/c123932-34682147.html>.

shadows in the cells of the periphery. They are like so many cages, so many small theatres, in which each actor is alone, perfectly individualized and constantly visible. The panoptic mechanism arranges spatial unities that make it possible to see constantly and to recognize immediately. (p. 200)

This seems to be exactly how the City Brain works: seeing constantly and recognizing immediately. Foucault further notes that everyone 'is seen, but he [sic] does not see; he [sic] is the object of information, never a subject of communication' (Foucoult, 1975, p. 200). However, I argue that the City Brain is not such a model of disciplinary mechanism. In terms of the Panopticon, what matters is that individuals must know or assume that they are being observed and accordingly regulate their own behavior according to certain pre-determined norms. Thus, the surveillance itself could be discontinuous or even not be exercised at all. Yet in the case of the City Brain, people might or might not know their being observed, while observing is an ongoing process that never ends. Sometimes people might be aware of being observed, such as when they drive past a crossing with traffic cameras, while in many other cases, it through people's unconsciousness that techniques of control function, nudging ones' behavior. Although in both the Panopticon and the city brain, people are the bearers of the power situation in which they are caught up, there is a significant difference: In the later, people are 'controlled' implicitly or explicitly by the data their own movements and actions create; while in the former, being anxious about their visibility to observers and potential surveillance, they regulate their own behaviour. Last but not least, the Panopticon refers to an enclosed, segmented space wherein 'the individuals are inserted in a fixed place' (Foucoult, 1975, p .197), while the City Brain works on an open, expanded field, where the movements of individuals are to the largest extent encouraged, although always being monitored and modulated.

Section 4.3 The Health Code

Felix Guattari has imagined a city where one would be able to leave one's apartment, one's street, one's neighbourhood, thanks to one's (dividual) electronic card that raises a given barrier; but the card could just as easily be rejected on a given day or between certain hours; what counts is not the barrier but the computer that tracks each person's position—licit or illicit—and effects a universal modulation. (Deleuze, 2017, p. 6)

In *Postscript on Societies of Control*, Deleuze (2017) precisely writes against and criticises this kind of possibility. However, this imagination has been actualized to a large or small extent in the big data era, especially during the outbreak of the COVID-19 when the techniques of big data are used to control the mobility and thus the spread of the disease. In such context, the 'electronic card' could be either material such as a facemask or digital such as the Health Code, which provides people the access to certain areas. Drawing on Deleuze's discussion of the societies of control, this section investigates how the Health Code, combined with grid management as introduced briefly in last section, realizes 'a universal modulation' of the movement of almost all people in China during the pandemic. I argue that the Health Code makes every movement of every person traceable, manageable, and controllable. Moreover, such

big data techniques as the Health Code have reshaped or 'reprogrammed' the cities, adding new procedures and regulations to the flowing of humans, objects and information and the organization of the space. Another reason that I investigate the application of the Health Code in the pandemic is that this is a time when the digital ways of life such as introduced in Section 4.1 are to different degrees disrupted and the movement of human and nonhuman agents, except the flow of data, is largely limited. It is also from this example that we can clearly see how the movement of people produces the flows of data, which in turn condition the former and effect a mode of movement control that is both distributed and centralized, that provides with people both some freedom and more regulation. Although I highlight, in Section 4.1, the conditioning of digital technologies on everyday life while in Section. 4.2, the reshaping of urban space and governance, this section is going to explicitly illustrate that they are the same process through the case study of the Health Code.

From Grid Management to the Health Code

Before going to the Health Code, I want to discuss more about the grid management, because it is based on the latter that the former could take effect. Under the grid management, the cities, districts (counties), subdistricts (streets or towns), and communities are divided into small grids, and various infrastructures, objects, humans, activities, and events within the grids are digitalized and datafied and then integrated into the urban management platforms. As discussed in last section, this kind of 'gridification' aims to implement more precise or refined management and control over the city. In May 2020, I lived in an 'urban village' (城中村) in one of the biggest cities in China, Shenzhen, where the mode of grid management has been well developed and widely employed. Each building and apartment had a QR code which was printed out and posted on the door, with a notice on it: 'Scan it, tell you the code of the house'. If we scan it, we will get a 25-digit code specified to the building or apartment and its detailed location information, as well as the phone number of the grid management office. People might ask, "Why do I need this information since if I have already come to this building, I must at least know its location?" However, the point is not the usefulness of the information itself. It is more about coding the apartments, digitalizing them, representing them on the online platform, and managing them smartly and efficiently. A few days after I arrived, several grid inspectors (网格员) came to my apartment and registered some of my personal information through their smart phones, including name, ID card number, phone number, and room number. In this way, the grid management office could know who lives in which apartment. Every building, every apartment, and even every person is a small point on the map of city management such as presented on the large screens of the management centres. Maybe the collection of the information is not that smart, but the overall grid management has been becoming smarter and smarter with the development of big data, which will be shown in the example of Health Code.

During the outbreak of the Covid-19, as Xiang (2020) observes, the grid management, or what he calls 'grid reaction', has become an important approach for the control of mobility and the spread of the virus. There are two stages that could be distinguished in the control of movement during the pandemic: complete lockdown and digital-controlled movement. At the first stage, the movement between, or even within, different grids or areas were strictly limited and people were either encouraged or required to stay at home and self-quarantine. Public transportation was significantly restricted, with much fewer buses, trains, and flights and stricter security measures than before the pandemic. Barriers such as wood, plastic, or iron fences, and even trucks and cars were set up between different grids. Inspectors waited at the intersections to check people's identity and residency and persuade them to go back to where they come from. These barriers materially 'gridifies' the cities, instead of administratively or digitally. Besides relatively large areas, a building, an apartment or even a person could also be taken as a grid as they are separated from others: For example, the masks could be considered as a kind of physical barriers that isolate people. In this case, the most basic units of grid management are the mobile individuals and 'the fragments of spaces occupied and traversed' by them (Foucoult, 1975, p .164).

Figure 15: A Plastic Barrier Used During the Pandemic[118]

In June 2020, I interviewed seven ordinary citizens living in different cities about how big data influenced their everyday life especially during the pandemic. I always invited them to describe the

[118] Photo taken by the author in Shenzhen.

situation during the stage of the lockdown, and one of them thus recalled:

> The neighbourhood [小区] was closed, was closed [She repeats]. At that time, if coming in and going out, you … At the beginning, [they] created an official account, when you came in and went out, you needed to scan [the QR code of the official account to register], because at that time one family could only go out once a day, [and] when it [the pandemic] was serious, every two days. So, it needed to be scanned. But because there were many elderly people in our neighbourhood, it was later replaced by issuing a card to each family. And there were dates on that card, when you went out, you ticked [under the corresponding date], and then [if] you went out today, you could not go out tomorrow. (Interviewee A)

This was a common situation during the lockdown when even leaving one's apartment, building or neighbourhood, not to mention the city or province they lived in, became difficult.

Here is another example which I experienced myself: In early February 2020, when I was returning to my hometown, in a highway exit, there was a checkpoint where all vehicles were pulled over and passengers got off. Our temperature was checked, and we were required to write down our personal information and destination. The vehicles with a license plate registered in certain provinces with high-risk areas at that time were not allowed to enter, unless the drivers and passengers lived in the town, and they could call the committee members of their village to prove their residency. After I completed the form and came back to the car, I saw cars registered in these provinces waiting in a long line along the road, and I did not know whether they passed successfully or not at the end.

The lockdown really changed people's perception and understanding of the space and movement. As another interviewee noted:

> Even places like beaches were enclosed, have you seen before beaches being enclosed? I had never seen this, this complete … which changed my perspective on space. I arrived at the beach… the place where I could usually see the beach, and was ready to walk in. It turned out that [I] found there was a fence slightly shorter than me blocking [the way] … I had to go forward [along the fence], walking forward hundreds of meters. So [at] a beach of more than one kilometre long [there was] only a small entry left for people to get in and out. (Interviewee B)

Before the pandemic, it was difficult, if not impossible, to imagine such a place as spacious as a beach of several kilometres long could also be enclosed artificially. Moreover, the barriers set up everywhere became the folds on and throughout the city space, bringing immobility and discontinuity and turning it into a gigantic mosaic or pleated plaid skirt. At the stage of lockdown and grid management, what counted were exactly the physical or policy-related barriers which limited the movement of people and turned a province, a city, a neighbourhood, or even a beach into a grid closed to others.

However, I observed that there were still many cases wherein the control of movement was never strict especially in those not very important nodes: The barriers could be so low to be easily strode over or so light to be removed; or they did not block the whole road and people and even motorbikes could circumvent them; and there were not enough inspectors to stay at every entry of the neighbourhoods. This could be further illustrated by another interviewee's story of her visiting a beach, who lived in the same city with Interviewee E:

One day I was going to beachcomb, the day [I] went to dig the abalone. At the beginning I did not notice it [i.e., the beach] was closed because the blocking … it was not very strict, it was symbolic, and I went straight into it. Only when I came out and was walking to the bus stop did I find that oh, it was almost completely closed. Then to get in [the beach] [we] needed … I saw a specific entry for getting in, and there was somebody watching […] When the tide ebbs, [from] any reef [we] could walk to the beach. That was how I went there: I was in another place and after it ebbed, I passed through the reefs on the sea. (Interviewee E)

At that moment, the ebbing of the tide and the baring of the reefs unfolded the space, smoothing the folds as if they had never existed. Or the ebbing of the tide was itself the folding of the ocean, which created unexpected passages through which people could eschew the barriers that partitioned the space. There is never really a boundary between the land and the ocean and likewise, we could not really split the city space using the barriers and obstacles. In fact, it was not the physical barriers that separated the neighbourhoods or communities and blocked people. I saw many times people moving away the wood or iron barriers on the road to get past when no inspector was there. It was not so much the ubiquity of the physical barriers as the fear of being infected and the power-knowledge relations (Foucault, 1980) constructed around the control and prevention of the Covid-19 that kept everybody staying at home, that crossed through and 'gridified' the space and regulated the (im-)mobility of people and things.

Things are different in the second stage when the restriction on movements need to be loosened due to the demand of economic recovery. Xiang (2020) suggests that economies like China could be described as 'mobility economy', where the movements of goods and people are indispensable for the economic growth and people's livelihoods. To revitalize the economy, the mobility disrupted by the pandemic and corresponding countermeasures needs to be restored. There are nonetheless conflicts between the concern for public health security and the demand of economic recovery, which are both correlated with the (im-)mobility. Under these circumstances, big data techniques such as the Health Code seem to provide a good solution to manage the movements and balance the conflicts.

The Health Code, also known as Anti-epidemic Pass Code (防疫通行码), is designed by the government and information technology companies such as Alipay and Tencent, and functions as a kind of electronic cards or digital pass codes for people to move within and across cities. People could apply for a Health Code in several popular social media or online payment apps (e.g., Wechat, Dingding, and Alipay). They need to provide some personal information including identity, health condition, and the contact history with (potential) infected persons, and based on the self-reported information and other data (e.g., location and movement history) collected by the government, the telecom service providers, and the app operators, the system would generate for each applicant a unique Health Code with one of the colours, green, yellow or red. Different colours have different meaning and authorize different permission to travel within or across cities: For example, in Zhejiang province, the red Health Code means the holder must self-quarantine for 14 days, the yellow implies a self-quarantine of 7 days, and the green gives the holder the permission to get around public places and travel to other cities. Moreover, with new data collected in real time, the Health Code will also be updated in real time.

Figure 16: Zhejiang Health Code System[119]

With the emergence and development of the Health Code, people are no longer required to stay at home as during the lockdown, if only they have a green code. As Deleuze asks, 'Why do you need to confine people since probability certifies to you that you will find them all on the highway on such and such a day at such and such an hour?' (Deleuze, 1986, no page). This has become a new routine for people living in the cities of China: Whenever one goes to a restaurant, a shopping mall, a hospital, a railway station, or any other public space, they need to take out their smart phone, open the app, find the Health Code, and present it to the staff. In this case, to cite Deleuze again, 'what counts is not the barrier but the computer that tracks each person's position – licit or illicit – and effects a universal modulation' (Deleuze, 1992, p. 6). This modulation, according to Deleuze and Guattari (Deleuze and Guattari, 1987), is 'perpetual, without aim or destination, without departure or arrival' (p. 353) as the Health Code controls and modulates everyone's movement in everywhere and at any time.

In the era of big data and smart urbanism, the city as the space of everyday life works as a general site or institution of control, but different from the essential institutions in Foucaultian disciplinary society, such as the family, school, barracks, factory, hospital, and prison (Deleuze, 1992, p. 3), the (smart) city is not closed but infinitely unfolded. It is also in this sense I say that a smart city is a 'flowing city' which exerts 'free floating control' (Deleuze, 1986, no page) over both human and nonhuman agents. As shown by the example of the Health Code, digital technologies turn the cities from what Deleuze and Guattari call 'striated space' such as produced by the grid management into 'smooth space'. As they put it, 'smooth space is constantly being translated, transversed into a striated space; striated space is constantly being reversed, returned to a smooth space' (Deleuze and Guattari, 1987, p. 474). The smooth space created by the Health Code seems to provide people with more freedom as they are allowed to move within or across cities with a green code. However, Deleuze and Guattari (1987) remind us:

smooth spaces are not in themselves liberatory. But the struggle is changed or displaced in them, and life

[119] Source: Cheng, Y., Yu, J., Shen, Y. & Huang, B. 2020. Coproducing responses to COVID-19 with community-based organizations: lessons from Zhejiang Province, China. *Public Administration Review*, 80, 866-873.

reconstitutes its stakes, confronts new obstacles, invents new paces, switches adversaries. Never believe that a smooth space will suffice to save us. (p. 500)

Instead of being simply liberatory, the Health Code brings a new mode of movement control as well as new ways of struggle, for example, around how to make and keep it green or how to go to a public space without it.

There is a logic of technology solutionism behind the application of the Health Code, which does not only believe that technology is the only valid approach to address the issues (Kitchin 2020, p. 12) but also assumes that given the costs and benefits, the (im)mobility could be optimized during a period when mobility has been politicized and ethicized: There are 'good' mobility (e.g., the returning to work of migrant workers) which can help to revitalize the economy and sustain people's livelihood, and 'bad' mobility (e.g., the movement of people from high-risk areas) which threatens the public health security and causes panic. Moreover, the Health Code helps to realize a mode of personalized governance, wherein different individuals are treated differently and provided with different goods, services, or policies, although under a universal governance system. As mentioned above, the movement of people is modulated individually and specifically based on everyone's own condition. It is in this sense that I consider the individuals (or even 'dividuals') as the basic units of the grid management. I argue that the key point of grid management is to make grids, which are manageable, controllable, and optimizable units. In this sense, the humans, other than the administrative regions of the cities, become the direct sites of (personalized) urban management and the most important infrastructure of smart city. Or, to put it slightly differently, grid management is not a mode of administrative management or emergency response, but a way of machinic enslaving through dividing and differentiating.

The Health Code and the Societies of Control

The Health Code has become one of the most important identities for people during the pandemic. As one of the interviewees remarked,

When we visit our clients, what we must present is the Health Code, as well as our ID. I feel like it is a rather important certification for us to meet with each other. Without it, you cannot even enter the building … It has become the identification of one person … This Health Code is approximately equal to whether I am healthy or not. (Interviewee D)

In other words, the Health Code works and operates through the production of subjectivity. This is a constant process, as every time people present their Health Code, it will be refreshed although the colour might or might not change.

Moreover, the Health Code does not merely act on individuated subjectivity but also works with sub-individual forces or 'dividuals' (e.g., mobility and perception of colours), as, in Deleuze's words, it

singles out potential sick people and subjects at risk, which in no way attests to individuation – as they say –but substitutes for the individual or numerical body the code of a 'dividual' material to be controlled. (Deleuze, 2017, p .7)

It does not merely identify people who are potentially infected or at risk but also appropriates the 'dividual' materials that can be controlled. It is their movement and risk level as represented by the colours rather than people themselves that matter in the operation of the Health Code. In addition, the Health Code gives the colours (red, yellow, green) with new meanings, while, for example, it could be confusing for people who could not distinguish red and green, and difficulties or glitches could occur when such sub-individual forces like perception of colours could not be successfully appropriated.

As both individuals and 'dividuals', humans become a component part of the social-technical machine of the Heath Code. By 'machine', I again refer to Deleuze and Guattari's conception of it and thus imply its potential to produce something new. The Health Code makes the grids within and across cities interconnected again and enables people to move freely without bringing too much risk to public health security. It also endows the human bodies with new capacities and functions as data producers and providers for the pandemic control and prevention. However, at the same time, the datafied bodies also become the instruments and sites for social control, as the data they produce in turn conditions others' and their own movement or mobility. This mode of power, distributed in the bodies and throughout the environments, is characteristic of Deleuzian societies of control. On the other hand, the Health Code also performs a centralized mode of governance as the (im-)mobility of almost all Chinese people is conditioned by this single technology, although different provinces use different Health Code systems, and the government of a city can control the movement of citizens of certain areas or the whole city by changing their Health Code into yellow or green for pandemic control or other reasons. During the pandemic, coding (赋码, assigning certain colours, especially yellow or red, to certain citizens' Health Code) and transcoding (转码, changing the colours of certain citizens' Health Code, usually from yellow or red to green) become important instruments and forms of governance. These two modes of governance, distributed and centralized, coexist in the operation of the Health Code.

The difference of the social governance mode effected by the Health Code from the lockdown or Foucaultian disciplinary society could also be seen from the fact that the Health Code is not designed for confinement but instead, for exteriorization or exclusion. The 'high risk', that is the persons with red or yellow Health Code, are excluded from the places they work at, the buses, metros and other public transport, the restaurants, supermarkets, and even the hospitals. Although we know that people with red Health Code are required to self-quarantine at home for 14 days and yellow for 7 days, self-quarantine, or confinement, is a secondary function, which serves 'a deeper function of exteriority', and 'a function of control that is of a completely different nature, involving open functions and not closed functions' (Deleuze, 1986, p. 20). In other words, the Health Code does not create or work in 'a closed disciplinary milieu', but effects 'an open formation of control' (Deleuze, 1986, p. 20), of which

excluding, or denying access is a major means of control. Not only the 'high risk' but people who are not familiar or comfortable with using smart phones and do not know to how apply for the Health Code sometimes are also excluded from the public space. For example, similar news occur repeatedly that an old person was not allowed to take a bus because he or she did not have the Health Code.[120] It raises people's concern about the 'digital divide' in this digital age, when certain groups of people would be left behind by advanced information technologies and become 'digital diaspora'. However, this concern might overlook the problem that the Health Code works exactly on and through exclusion, on a universal modulation of (non-)access. This problem of digital inclusion and exclusion does not only concern 'digital literacy' (Burns and Welker, 2022, Thompson et al., 2014), that is the abilities and skills to deal with digital technologies. Rather, as shown by the Health Code, it is essential to how power is enacted through digital technologies.

Furthermore, such big data techniques as the Health Code are not only used in the state of emergency but shows the tendency to become increasingly common in urban management. On May 22, 2020, the Health Commission of Hangzhou proposed an idea of the 'Gradient Health Code' (渐变色健康码), which, based on the data collected from the medical records, physical examination reports, and so on, assesses and quantifies the health condition of both individuals and groups such as communities and enterprises, and uses different and gradually varied colours, instead of just red, yellow and green, to represent it, so that we could 'know one's health by one code' (一码知健).[121] This no doubt aroused a wide discussion around technology, privacy and ethics. Although this is still a conception, we can see how such a technique designed to deal with an emergency could be routinized and normalized, as well as the popularization of big data in social governance.

As Datta and Odendaal (2019, p. 388) put it, 'It is the interspersing of routine with sporadic and concentrated acts of soft power and brute force that makes the smart city an embodiment of state governmentality from the global north to the global south.' In Section 4.1, by a quite descriptive engagement with the empirical examples of the smart city in China, I want to highlight the banality and routineness of the urban infrastructures and digital technologies, as well as ways of life they create and enable, that people could encounter every day. Datta and Odendaal (2019) further argue that '[t]his routineness has been normalised as mundane and banal, and therefore unspectacular and depoliticised' (p. 388). I think in the context of a digitalizing society of China, this routineness both produces and is supplemented by the general indifference of the society towards digital technologies as discussed in

[120] Wang, Y 2020, 'An old man did not have the Health Code and was persuaded to get off the bus! It caused hot debate', *CCTV News*, 24 August, accessed 14 November 2022, <https://3g.163.com/dy/article/FKQU2VF90530RJ4L.html?f=common-recommend-list>.
[121] Zhang, L 2020, 'The Health Commission of Hangzhou responded to the 'Gradient Health Code': it is only an idea, and there is no plan for launching', The Paper, 27 May 2020, accessed 14 November 2022, <https://www.thepaper.cn/newsDetail_forward_7579606>.

Section 3.3.

Of course, the routineness is interspersed with ‘sporadic and concentrated acts of soft power and brute force’, such as those surveillance and security technologies I introduced in Section 4.1, which I argue have already become a kind of routine. The development of the City Brain, discussed in Section 4.2, could also represent ‘concentrated acts of soft power and brute force’, as well as centralized governance of the urban space and flows. Its most notable feature is its making a city into an organism, that is a centralized, hierarchized, and self-regulated body, according to a neurological mould. However, it is in the pandemic that I observe the irruption of the ‘acts of soft power and brute force’ associated with digital technologies. As Kitchin (2021, p. 207-17) notes, during this period, a variety of digital technologies have been developed and used across the world to control the spread of the disease and the movement of people. But what is notable about the Health Code is that it influences the movement and life of almost the whole population of a country (and the largest in the world) and has been being used even until the end of 2022, nearly three years after the outbreak of the pandemic. As discussed above, it has become a new routine or habit of Chinese people to present the Health Code whenever they go to public places or take public transport.

Through these three sections, the key issues I want to address are how the movement of human and nonhuman agents is conditioned by the flows of data they produce and how this reshapes urban governance and everyday life within the routineness intersected by soft power and brute force. In this process, digital technologies do not only produce and require a certain kind of digital subjectivity or smart citizenship (Burns and Andrucki, 2021, p. 12) but more importantly, to use the terminology of Deleuze, Guattari and Lazzarato, actualise a new, digital mode of the production of subjectivity and social control, in which both human and nonhuman agents, as both individuals and ‘dividuals’, are ‘enslaved’ by different socio-techno-datalogical machines which influence their movement and life. This digital and machinic mode of control, exemplified by the Health Code, is characteristic of the Deleuzian society of control in an era of big data and smart urbanism. I argue the development of smart urbanism in China, as discussed in this chapter, shows that urban governance and social control work on both decentralization and centralization, rather simply distributed within and through the urban environments.

In addition to the power relations, from the everyday engagement with digital technologies to the City Brain and to the Health Code, this chapter also illustrates that humans and technical objects are not external to each other as users and tools. Rather, in Lazzarato’s words, they are ‘recurrent and interchangeable parts’ of different socio-technical machines (Lazzarato, 2014, p. 26). At the same time, they also ‘mutually co-constitute each other’ (Kinsley, 2014, p. 372): On the one hand, a technical object, such as the Health Code, does not only consist of particular devices and algorithms but also the movement, labour, and behavior of humans (and nonhuman agents) that are necessary for its operation

and reproduction and thus is equivalent to the socio-technical machines or processes it enacts; on the other, in this digital era, digital technologies are not only part of our life and subjectivity but also constitute our 'dividuality' – making us no longer individuals. This co-constitution is not fixed or stable but a constant process keeping changing with the production and reproduction of different socio-technical machines. Besides, the chapter also suggests that the relation between humans and technologies should be understood within specific socio-cultural contexts. Here the symphony of the ubiquitous visibility of digital technologies and the social unconscious towards it is characteristic of the digitalizing society of China. This is related to the discussion of big data as a kind of cosmotechnics in Section 3.3 where I argue that ontological, instead of ideological, differences should be taken into consideration.

In the next chapter, I am going to discuss the epistemological and political consequences of big data and smart city from the perspective of the relationship between data and voice, and through an empirical engagement of the development of short video platforms as well as other social media. Gabrys (2016) suggests that 'the ability to have a voice and participate within the communicative registers and exchanges enabled through digital technologies' is crucial to the citizenship in the smart city. In an era of big data, I argue, both individual and collective voice is increasingly influenced by it which participates in the production and dissemination of knowledge and discourse not only in academic research but also in everyday life. This can be shown by the fact that especially during the pandemic, people increasingly rely on short video platforms and other social media as an important information source and instrument to publish opinion and communicate with each other, while these platforms increasingly use recommendation algorithms based on big data to organize, deliver and present their media content. More specifically, I discuss how big data, through recommendation and other algorithms, influences, respectively, the information one can be exposed to, the extent to which one's voice could be heard by others, and the development of public opinion and public attention as collective voice on social media. If Chapter IV focuses on Foucaultian 'biopolitics' (Foucault et al., 2008) or what Gabrys calls 'biopolitics 2.0', that is the governance of life and ways of life through distributions of power (Gabrys, 2014, p. 35), in next Chapter I turn to Lazzarato's 'noopolitics' – the politics of 'the incorporeal dimension of bodies' (Lazzarato, 2006, p. 185), which also means 'moving from technologies governing the body towards technologies that gather publics together and control their actions' (Karppi, 2013, p. 11-2).

Chapter V. Data, Voice and Speaking

Section 5.1 As the Big Data Says

In this Chapter, I investigate the epistemological and political implication of the development of big data and smart city, and more specifically, their influence on both individual and collective voices, through an engagement with short video platforms and other social media in China. As Gabrys (2016) suggests, the construction of a smart city requires and produces smart citizens and citizenship and

> If we follow one historical thread of what counts as a citizen, this requires that one have a voice or be able to communicate within public and urban forums. By extension, to be a citizen in the smart city would require that one has the ability to have a voice and participate within the communicative registers and exchanges enabled through digital technologies. (p. 220)

I observe that especially during the pandemic, short video platforms become important space for Chinese people to communicate with each other, publish opinions, seek for help and attention. Relying on big data to organize, recommend and present content, short video platforms as a kind of social media largely influence the information one is exposed to, the extent to which one's voice can be heard, and the development of public opinion on them. These are the issues I am going to discuss in this chapter. Drawing on Lazzarato's (2006) discussion of noopolitics, I want to argue that speaking, especially in relation to the development of public opinion, is a way for being-with-each-other, which has increasingly been influenced by big data.

But before going into how digital technologies affect the voice of people, I want to discuss first how big data produces its own voice, and thus starts with the influence of big data on knowledge production and dissemination from a posthuman perspective in this section. A great deal of previous research has indicated the social-spatial and political influences of big data. For example, Ash et al. (2018) suggests that big data plays a crucial role in 'mediating and augmenting the production of space and transforming social-spatial relations' (p. 29). Graham and Shelton (2013) further argue that since big data is constructed and collected imbalanced under social-spatial contexts, it not only manifests material inequalities but in turn has real and material influence by 'enact[ing] or reinforc[ing] particular uneven socioeconomic outcomes and depoliticiz[ing] questions of knowledge production, social justice, and the distribution of resources' (p. 258). Influencing knowledge production and resource distribution is a major way for big data to participate in social-spatial production and reproduction. Yet, in this section I am more concerned with how big data affects individuals' behavior and life, rather than scientific research and policymaking, through influencing knowledge production and dissemination.

Whether a datalogical turn in epistemology has already happened is still disputed, however everyone cannot ignore that big data increasingly plays an important role in producing discourses, scientific facts, knowledge, and truths. This is not only implied by the wide use of big data in both sciences and social sciences research but more importantly, lies in its employment both as a methodology and concept by different agents including the government, social media, and the public in policy documents, news reports and even daily conversations, in so far as such clauses as 'According to big data' or 'As the big data says' are often used by people to support their arguments or conclusions. It does not matter whether they have really performed big data analyses, or the data used meets the standards of big data but rather, it is simply the use of such a concept that seems to establish the truthfulness of whatever follows. Big data is not only a methodology for doing research and producing scientific knowledge but also serves to support the authenticity of the knowledge or discourses which it produces or what is endorsed by it. I think this is the double sense of Chris Anderson's (2008) claim that 'the numbers speak for themselves': On the one hand, data could speak something by themselves; and on the other hand, they assert that what they have said or whatever is said through them is correct. It is the power of big data in producing knowledge and establishing truth (or truthfulness) that I address in this section.

An epistemological revolution

To begin with, the development of big data introduces a new paradigm of data-driven sciences and social sciences. As Anderson (2008, no page) puts it:

> Out with every theory of human behavior, from linguistics to sociology. Forget taxonomy, ontology, and psychology. Who knows why people do what they do? The point is they do it, and we can track and measure it with unprecedented fidelity. With enough data, the numbers speak for themselves.[122]

There is a false assumption that everything is already implied in and can be disclosed and represented by data. It is in this sense that Anderson argues data could speak for itself. This claim is alluring because '[w]e can throw the numbers into the biggest computing clusters the world has ever seen and let statistical algorithms find patterns where science cannot'. In this case, big data 'offers a whole new way of understanding the world' and brings about an epistemological revolution (Anderson, 2008, no page).

However, this announcement of 'end of theory' is not a new thing introduced by the emergence of big data but instead, has a long history which can be dated back to the quantitative revolution in Geography and other social sciences beginning in 1950s, of which the 'big data revolution' could be considered as a continuation (Barnes, 2013). Therefore, the criticism of quantitative revolution is also applicable to big data. For example, Barnes (2013) suggests that Andrew Sayer's (1984) response to the supposition

[122] Anderson, C 2008, 'The end of theory: The data deluge makes the scientific method obsolete', *Wired*, 23 June, accessed 1 August 2022, <https://www.wired.com/2008/06/pb-theory/>.

of ‘innocent number’ has already criticized the ‘data determinism’ that human geographers encounter nowadays (p. 300). Kitchin (2013, 2014) further indicates that the construction and explanation of big data are based on speculation, scientific reasoning, and domain-specific knowledge, and are not free of (imbalanced) socio-geographical contexts or human bias, which is coincident with Sayer’s (1984) argument. Therefore, this section is not going to provide more similar criticisms towards the ‘data determinism’ but instead, intends to discuss how, despite these criticisms, big data influences the production of knowledge and discourses not only in science and social science studies but more importantly, in our daily lives.

Big data has remarkably been employed in addressing as wide a range of topics as education, health, medicine, surveillance, accounting, finance, tourism, transportation, marketing, energy, development, the environment, urban planning, smart farming, decision making, supply chain management, political orientation, criminal justice, equality of opportunity, and so on. Take quantitative urban studies for example. Reades et al. (2009) utilize around 3.5 million telecoms usage records to analyse the space structure and activity patterns in the city of Rome; Roth et al. (2011) study the data of more than 11 million individual movements from the London subway card database, which showcases the polycentric structure and organization of London; Zheng et al. (2013) refine the inference of air quality through combining given air quality reports and other data sources such as meteorology and traffic flows; based on a massive amount of historical data from local chronicles and historical research, Long et al. (2014) estimate the arable land patterns in Jiangsu Province, China in 1812; and Liu et al. (2016) collect nearly 2.3 million photos of 26 cities to measure public perception of each city. Despite different mathematical models and analytic tools used in different research, big data plays the same crucial role in constructing a new data environment, within which human activities, urban structures and changes, and the flows of other agents and factors are portrayed minutely and vividly.

In such social big data research, various methods such as machine learning, semantics, text analytics, community detection algorithms, social network analysis, and information diffusion and fusion models (see Bello-Orgaz et al. (2016) for detailed introduction of these methods) are combined quite well to exploit the value of data. Yet, besides these big data analysis methods, the approaches for data collection that are more noteworthy are those such as crowdsourcing, in part because it is becoming a more and more popular way of gathering data (Liu et al., 2016), but more significantly because citizens themselves serve voluntarily or unconsciously as a human “sensor”, collecting, recording, and sharing information. In the first case, people willingly and actively participate in a project and contribute to it the data they collect, while in the second, they just do what they do on social media and their data are mined and exploited by researchers without themselves knowing it.

This distinction does sound trivial, but my aim is to highlight the role of individuals in knowledge production during the big data era, especially in terms of the second case. Everyone as data producer

and provider always participates in knowledge production. This is apparent in the research on geo-tagged social media: For example, Procter et al. (2013) survey the tweets in England during the August 2011 riots, studying how Twitter users respond to riots and rumours; Colleoni et al. (2014) investigate the political content shared on Twitter to identify the posters' political orientation, as Democrats or Republicans, and to measure the political homophily within different groups; and Shelton et al. (2014) analyse the spatial patterns of tweets related to Hurricane Sandy to question the 'imperfect representations of the world' (p. 167) by these data. In these examples, posters of these tweets act as data producer and thus participate in the industry of knowledge production although they are largely unaware of it. Yet a class structure is clearly obvious here: On one side, people who produce the data consciously or unconsciously; on the other side, those who have access to the data and the ability to analyse and utilize them.

However, what concerns me most is the process of knowledge production in daily life when we engage with the digital world, especially with social media platforms, given that these platforms are an important, if not now, in the developed world at least, the most important source from where we get knowledge and information. In this context, knowledge includes both the information which users post and share on these platforms and that which are produced in this process, such as, the knowledge inferred from and about users' activities and behaviours. One of the most common examples of the latter is the inference of users' preference, or more generally, what type of person a user might be. In other words, this kind of knowledge is the subjectivity big data produces and assigns to users but by calling them 'knowledge'. Big data ceaselessly produces *knowledge* about users during their interaction with it, to the extent that people sometimes would exclaim that 'Big data *knows* about me better than myself'.

It should be noted that there is the lack of a human subject who prehends this knowledge, as it is directly fed back to the systems (such as in the recommendation mechanisms adopted by platforms). I think Anderson's editorial mentioned above has indicated in some sense this 'end of knowing' when he illustrates that 'Google can translate languages without actually "knowing" them' and 'can match ads to content without any knowledge or assumptions about the ads or the content' (Anderson 2008, no page). In such practices as machine translation and ads 'pushing', there are just direct 'translations' from data to activities, and from activities to data. It seems that in the big data era knowing (or knowledge) is not necessary. While imagining a ubiquitous computing world, Weiser (1991) already pointed out the lack of necessity for acquiring certain types of information in this kind of world:

> When almost every object either contains a computer or can have a tab attached to it, attaining information will be trivial: 'Who made that dress? Are there any more in the store? What was the name of the designer of that suit I liked last week?' The computing environment knows the suit you looked at for a long-time last week because it knows both of your locations, and it can retroactively find the designer's name even though that information did not interest you at the time. (p. 104)

On the other hand, knowledge seems to be reduced to patterns and correlations captured by big data. I argue that there are ontological implications for knowledge in the sense that this kind of knowledge is circulated in the operation and function of algorithms rather than comprehended by any human subject; and thus, it has its ontogenesis independent from the latter. This said, it does not mean that humans could not approach and examine such knowledge. For example, a bank manager could check the risk levels of his or her clients, although nowadays this too is increasingly done by big data in many cases.

The (implied) knowledge big data has about users' preferences conditions the information they will be exposed to, as social media platforms are increasingly relying on big data and recommendation algorithms to deliver and present content. This is not some news for anyone who is familiar with big data or social media, but I would like to highlight the relationship between these two different kinds of knowledge: the knowledge users learn from social media and that which big data produce about themselves. Although in most cases, big data does not directly participate in the production of the content posted and shared on social media, unless it is, for example, a scientific report with results based on big data analysis, it plays an important role in the dissemination of them through the continuous production of another kind of knowledge (that about the users). In this sense, it seems that what is important is not the knowledge users acquire, nor whether they are true or false, but the knowledge about users themselves (or about their preferences on the content posted and shared) as produced by big data. The latter is practical and functional – yet more implicit – in the general process of knowledge production. To put it another way, it is a component part of the socio-technical machines constructed by big data, which condition the information and knowledge we have access to whilst at the same time modulating our behavior and daily lives.

In the epistemological turn brought by big data, it is the production of the implicit knowledge embedded in the operation of big data that we should pay more attention to. There is ubiquitous, continuous, and automatic production of knowledge in as much as there is such production process of data. This knowledge belongs to digital devices rather than humans. In this case, this epistemological revolution does not only bring about methodological innovation, that is, new methods and ways to produce knowledge and establish truthfulness, but also change the way how we understand knowledge, as well as its relation to the human subject and its roles and functions in affecting human choices and behaviours. Knowledge is not just that which is presented to us and what we can learn from the outside, but it also includes that which is not or even could not be known by a human subject yet supports the operation of systems based on big data or better still, data machines, as I would call them. What big data knows about a person is sometimes more important that what he or she knows from big data.

I suggest there are three senses of the title I have used for this section 'As the Big Data Says'. First of all, big data has been widely used as a new methodology for knowledge production especially in scientific studies (big data says about what is true); secondly, big data, as both a practice and a concept,

has been employed by people to construct the truthfulness of their arguments or conclusions (big data says what it says is true); thirdly, big data produces knowledge about people who encounter and interact with it (the 'what' big data says about who we are). In general, I argue that big data is a new way of speaking, which mediates and even to some extent displaces the speaking of the human subject. The first sense has been well illustrated by many seminal studies, some of which I have referred to above, and I hope I have addressed the third sense in a more or less clear way here. In the following part, I will turn to the second sense, in terms of how big data establishes the truthfulness of knowledge and discourse.

A new way to establish truth(fulness)

> As we codify ever more of what we are and what we know in digital data shadows, big data has emerged as not just a way of describing data itself, and our increased prowess in measuring, mapping, analyzing, and visualizing, but a meme that speaks to and produces new ways of establishing truth. (Graham and Shelton, 2013, p .256-7)

Establishing truth is different from producing knowledge. The establishing of truth has two steps: The first is to produce certain knowledge or discourse and the second to attribute truthfulness or facticity to it, although these two steps are often integrated and intermingled in one process. Big data does not only provide a methodology for producing knowledge but also a way to construct the truthfulness of the knowledge and discourses. The former relies on the techniques and practices of big data analysis while the latter concentrates more on the discourses developed about it. It is the assumptions about the characteristics of big data as all-inclusive, unbiased, its realtimeness, objectivity and scientificity, that build up its power for establishing truthfulness. In these assumptions, big data is described as that which 'allow[s] us to objectively measure and map the world as it actually is in order to arrive at fundamental truths' (Graham and Shelton, 2013, p. 257).

On social media and in daily life, as well as in government documents and news reports, people might tend to care less about the process of how big data produces a conclusion than how they could use big data to support their argument, both methodologically and discursively. This can be illustrated by the frequent occurrence of such clauses as 'According to big data', 'Big data tells us…', 'As big data says' and so on in governmental and commercial reports and other articles published on social media. On one hand, it shows an increasing trend of the application of big data in academic research and commercial analysis; and, on the other hand, it also indicates the popularity to utilize or emphasize the usage of big data to establish truthfulness. In this case, what we should pay attention to is not only to what extent and how big data participates in the production of knowledge and discourses but also how it is employed, especially as a concept, to validate them. In some sense, it is in the using of those clauses rather than the real employment of big data techniques that construct the truthfulness. For audiences, big data could be a 'black box': They do not know what researchers do with big data and whether the latter really derive their conclusions from it. They might simply accept (or reject) what big data says or what is

claimed to be said by it.

Even in daily conversations, one can start an argument with the phrase 'According to big data' followed by the opinions or facts she would like to highlight. A bizarre example I find on social media is when people say:

> *Big data tells us*: You are not alone, [and] many of the problems bothering you also bother others. Some are not worth the time and energy, so [you] can let them go.[123]

It does not matter whether there is some truth to such sentences of 'chicken soup for the soul' or how and whether they are derived from big data. One could always give such kind of advice and the listener in most cases will not question its truthfulness. Yet this illustrates the prevalence of using big data to establish truthfulness or facticity even in daily life because of its claimed objectivity. In some cases, it does not really need to come from the conduct of big data analysis. Rather, big data as a concept becomes a rhetoric device which supports a given idea.

Another aspect of big data power in establishing truth or truthfulness is reflected when people say 'Big data knows me better than myself'; or, in any other scenario when big data conditions the choices or resources people have, the information they can access and their everyday life in general. There is a certain degree of power established, and truthfulness constructed, when big data defines what kind of person we are through the production of subjectivity: It seems that what big data says are more or less true about us. To put it another way, for big data, what kind of person a user is or what kind of life she wants to live is a kind of truth that need to be uncovered – life is a kind of truth. It is in its conditioning of everyday life that I see the most significant power to establish truth. If we dislike, say, a video pushed by big data, we could choose not to watch it, but how could we fight against these kinds of power relation when algorithmic recommendation is everywhere?

Of course, we should understand the processes of how big data participates in knowledge by producing and truth established in relation to the socio-political and academical backgrounds or what Foucault (1980) calls the 'regimes of truth':

> Each society has its regime of truth, its 'general politics' of truth; that is, the types of discourse which it accepts and makes function as true; the mechanisms and instances which enable one to distinguish true and false statements, the means by each is sanctioned; the techniques and procedures accorded value in the acquisition of truth; the status of those who are charged with saying what counts as true. (p. 131)

Big data is merely one among many devices where a regime of truth establishes the boundaries between truths and fallacy. In this sense, it is not big data but the regime of truth in general that determines which could be accepted as true or false. On the other hand, it does not mean the development of big data could not change the current regimes of truth, not only by bringing about methodological revolution but

[123] YishangyunqingN3 2019, 'What big data tells us?', *Jianshu*, 13 March, accessed 21 September 2022, <https://www.jianshu.com/p/1ee52a421ef1>.

by changing ‘who are charged with making what counts as true’. For example, it could be the case that only the people having the access to it or big data itself could say what is true. Although the forming of a socio-technical machines based on big data is not free of human participation, it could be an independent agent itself, capable of knowing and saying. By this, I am not confusing big data with artificial intelligence but rather referring to the former as a process of knowledge producing and truth establishing especially in its operation withing different digital platforms which condition our everyday life.

Our knowledge, imagination, and ignorance about big data is constitutive of its power in establishing truthfulness. Living in a time of social media, one could engage with big data at any time and place and hear about it everywhere while having little knowledge about it. We are always both familiar and unfamiliar with the digital technologies at hand: we know almost everything about how to use them but little about their essence. That is to say, in Heidegger’s words, they are ready-to-hand but not present-at-hand: The former is ‘a mode of interaction, in which we put aside the question of ideality and objectivity and let the object appear to us according to its functionalities’, while the latter ‘a mode of comprehension that renders a thing an object for consciousness and attempts to arrive at the essence of that object’ (Hui, 2016a, p. 16). It is this semi-familiarity with big data that leads to the acceptance of its authority. On the other hand, deeper understanding about how big data works might also subject one to its functioning logic, even when she uses such knowledge to perform anti-algorithm strategies. For example, out of the aversion to repeated presentation of similar content, one could ‘dislike’ everything recommended by big data until something new occurs. In this case, more than a ‘revolt’, such strategy also helps big data know better what types of users we are or what we really like. To ‘play’ with the algorithm, our behavior also follows its logic. Therefore, what is needed is not expertise but the reflection on the essence of digital technologies during our daily engagement with them.

Although big data could not completely replace other methodologies, it nevertheless squeezes and encroaches their space for producing knowledge and establishing truth. I attempt to highlight the dailiness of big data’s appropriation of such power, that is, its participation in the producing of knowledge and establishing of truth in daily life. For one of the most important problems in this big data era, I believe, is how an ordinary person could question the discourses produced by or claimed to be produced by big data and challenge their truthfulness. This also concerns how one confronts the knowledge produced by big data about him/herself. It is easy to argue we could not let big data define who we are and what we like, but the problem is how one could escape from the limiting of big data in a time when what we can learn and know are to a large extent influenced by it and the digital technologies in general.

Section 5.2 Voice and Data

Let the data talk

> Voice as a process – giving an account of oneself and what affects one's life – is an irreducible part of what it means to be human; effective voice (the effective opportunity to have one's voice heard and taken into account) is a human good. (Couldry 2010, p. vi)

As big data, as well as data science in general, has been becoming an important reference for government policymaking, commercial analysis and academic research, there is a concern that the voices of individuals could be overwhelmed by the deluge of data. Researchers and policymakers might concentrate on the overall patterns and trends that big data captures and represents while ignoring the vicissitudes of peoples' lives beyond the samples, no matter who is included or not included in them. In this case, people's real need and interest would be overlooked. This is especially so for the minorities, which here do not refer to groups of people of certain ethnicities, cultures, or religions but rather those whose voice is largely unheard in this big data era. They could be those underrepresented by data or those who do not have access to big data or capacity to analyse it. In a sense, every person could become minority in so far as we are represented (or underrepresented) by data.

Nick Couldry (2010) points out two senses of 'voice': the sound of a speaking person and the expression of something, especially in the political sense (p. 1). My inquiry into the missing of voices of the minorities focuses on the second sense of it but understands the word 'political' more broadly by taking speaking itself as 'political'. For me, voice is not only the communicating of opinion, or what Couldry dubs 'a distinctive perspective on the world that needs to be acknowledged' (Couldry, 2010, p. 1), but the expressing of anything which one wants to be heard by others. It is the expressing of oneself, of one's experiences, emotions, needs, and desires. My use of the term is also different from Aristotle's discussion of it in the *Politics* as the capacity of expressing basic sensations which is shared by humans and most animals (Couldry, 2010, p. 3). It is neither the sound of chatting or groaning nor political speech but the telling of one's own story aiming to draw others' attention and to be heard by them. Thus, I incline to Couldry's understanding of it as 'the process of giving an account of one's life and its conditions' (Couldry, 2010, p. 7).

For Couldry, this storytelling is not without purpose. It aims to share an experience, give advice, express a need, seek attention, ask for help, or more generally, to be heard. To be heard is to make the voice be engaged widely and affectively by others, to connect the speakers with the listeners. Voice as a social process is not just about making sense of one's life by and for oneself but also to make others understand it, which includes, to quote Couldry again, 'from the start, both *speaking* and *listening*'; being heard is the necessary condition for 'an effective process of voice' (Couldry, 2010, p. 8-9, emphasis in original).

Moreover, voice as a process of storytelling with the aim to be heard is one of the very conditions of

human life. As 'self-interpreting animals' (Taylor, 2017), human beings are always giving accounts of their behaviours, lives, and positions within the world. It helps one to make sense of one's life and experience and more importantly, to relate oneself to oneself, others, and the world. As such Couldry argues that to deny the value of voice and people's potential for it is to deny 'a basic dimension of human life' (Couldry, 2010, p .7).[124] Couldry further suggests that voice is embodied, that is, articulated 'from a distinctive embodied position' (Couldry, 2010, p. 8). This 'embodied uniqueness' (Cavarero, 2014, p. 21) adds to the value of voice. Moreover, it also implies that voice could not 'be read off from instance' (Couldry 2010, p. 8) but should be listened to closely, carefully, and uniquely in terms of the embodied positions of both the speaker and the listener. In other words, voice is embodied relations between people.

However, in the big data era, the value of voice has to some extent been displaced by data. It is data instead of voice that gives accounts of one's life, especially when voice becomes data such as in the research on geotagged social media content (e.g., tweets). To start with, data is a process of aggregating, within which numerous people's lives and stories are compressed into a data set. The larger the sample size is, the feebler individuals' voices would be. The uniqueness of them disappears in the general patterns that big data tries to capture and represent and more concrete, vivid stories about the lived experience of individuals are ignored and unheard. Despite its all-inclusive claim and attempt, there are always some people, as well as things and activities, omitted by big data, such as those who do not have smart phones or never use Facebook and Twitter; for those who are included in the sample, their singular voices and narratives are also covered and replaced by data. This could be illustrated by what happened during the pandemic when the government, as well as the public, might care more about the number and spatial distribution of infected persons than the specific experiences and situations of the people affected by the pandemic. Of course, the replacing of individual differences by the generality is not a new thing brought about by big data but rather accompanies the development of statistics and data science. Yet the emergence of big data amplifies this problem as the increasing volume of data makes it even harder for individuals' voices to be heard.

This seems to be an era when data outweighs voice so that people themselves do not need to speak and data could speak for them. For example, many universities in China use big data to identify potential poor students and 'secretly' transfer meal allowance to their student cards without notifying them in advance in order not to hurt their self-esteem. This is because before

> Some colleges and universities even let poor students come to the platform to give speeches, talking about the poverty of their families, and used this as the basis for granting subsidies. As a result, their working methods

[124] This said, it does not mean that voice is exclusive to humans or that the voices of nonhuman agents do not matter, but my focus here is human voice, especially in terms of how it as a process is impacted by big data.

were accused of being simple and rude, which damaged the self-esteem of students.[125]

We can see the kind, careful consideration of universities in utilizing big data instead of requesting students to self-report their families' financial situation. But this example also suggests that voice might be unnecessary in this era since everything could be indicated by data. I mean, who needs to talk, if big data knows everything about and says everything for us before we could have the chance to say it ourselves? At least shown in this example, it seems that big data could give an account of who one is and what she needs even better than herself. There are more examples like this when the voices of, say, customers, passengers, students, patients, and citizens in general are gradually substituted by data. Yet here it has nothing to do with aggregating but concerns differentiating, individuating, and personalizing. It is about recognizing the patterns of individuals rather than those of groups, about identifying the differences of one from others.

Aggregating and individuating are two different processes of big data. The former reduces individuals to a part of a certain group sharing similar patterns or problems, while the latter attempts to profile the distinctive characteristics of individuals as minutely as possible. While aggregating is a common process for all sorts of data analysis techniques, individuating is specific to big data especially when it is employed to draw so-called 'user profiles'. 'Let the data talk', people say. This trend is not only more and more popular in government and business decision-making but also in our daily life as big data increasingly entangles itself with the latter everywhere. However, I argue this is no more than an illusion that data could speak for and by themselves. In this big data era, one of the most important issues facing us is: How could one's voice pass through the 'bigness' of data and be heard by others, especially when big data does not only undermine the value of voice and the forms for its expression but also influences whose voice can be heard or not heard?

Being seen or being heard: a case study of Kuaishou

The development of the Internet, particularly social media, certainly provides a way for people to share their lives, feelings, and thoughts, to express themselves in different forms of media (e.g., text, voices, images, and videos). However, even in the age of social media, only a small number of people could get significant attention from others, specifically politicians, celebrities, scholars, and so-called 'Key Opinion Leaders' (KOLs). The development of big data-based content delivery mechanisms seems to bring a new possibility for the voice of normal people to be heard. Under such mechanisms, the media content a user posts online will be recommended to many other people to see, not only her friends or those who follows her. This is how short video platforms such as Douyin and Kuaishou work. Shu Hua,

[125] Xidian University 2019, 'Use big data to distribute meal allowance, 'fully' warm the hearts of students', 26 September, accessed 27 September 2022, <https://news.xidian.edu.cn/info/1482/205932.htm>.

the CEO of Kuaishou, thus claims:

> Attention as a kind of resources, a kind of energy, can shine on more people like sunlight, instead of being focused on a few people like a spotlight – this is a simple idea behind Kuaishou.

He defines attention as a key resource of the Internet, 'the distribution unevenness of which might be more significant than other resources' and contemplates Kuaishou, with its recommendation algorithm, as a solution to this problem, by 'letting more ordinary people get attention'. He suggests that users can upload the videos they make which will be equally recommended to and seen by others, which is totally controlled by the algorithm.[126]

Short video platforms are quite popular nowadays in China. Take Kuaishou for example:

> As of June 30, 2020, within the last six months, the number of average daily active users of Kuaishou's main app is 258 million … users' average daily usage time is more than 85 minutes, and average times of daily visits more than 10; short videos and live broadcasts have received a total of 1.5 trillion 'Likes' and 6 billion times of sharing, and a total of 122 billion user comments; users sent through the platform over 40 billion private messages.[127]

These platforms are not only for watching videos; rather, they are more like social media, on which people express themselves and communicate with each other. Besides sharing their life moments, people could also, through producing and uploading videos, express opinions, complain about unfair treatment, disclose problems or other information, appeal for help and so on, as what others do on Facebook or Twitter. Therefore, these platforms, like other social media, are an important space and instrument for people to speak, to tell stories and give accounts of themselves. By more equal distribution of attention, Kuaishou claims that everyone can record and share their life and 'every [or everyone's] life can be seen' (Research Institute of Kuaishou 2020).

In the big data era, it is quite easy to be seen – everyone is incredibly visible. Our behaviours, movements and activities are 'seen' all the time by ubiquitous cameras, sensors and other digital devices, particularly smart phones, not only through videos but data in general as the media. Yet compared with text and images, videos can deliver richer ideas and feelings in a more realistic and vivid way and due to the development of technology, the cost and requirement of making videos is rather low and thus almost everyone can participate in it (Research Institute of Kuaishou 2020, p. 5). This leads to a revolution of the mode of seeing and being seen so that not merely the elite but ordinary people can record and share their lives via videos and can be seen by others (Zhao 2021, p. iv-v).[128] In other words, making and posting videos provides people more opportunities to better express themselves and get attention. This is one of the major reasons why I pay a lot of attention to short video platforms in different parts of the thesis.

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[126] Research Institute of Kuaishou 2020, *The Power of Being Seen: What is Kuaishou?*, Citic Press, Beijing.
[127] Real Story Project (eds) 2021, *Anthropology on Kuaishou*, Taihai Publishing House, Beijing, p. 77.
[128] Research Institute of Kuaishou 2020, *The Power of Being Seen: What is Kuaishou?*, Citic Press, Beijing.

I want to discuss a little bit further the question of videos as a medium for seeing and being seen by investigating the example of the so-called 'overseeing on the Cloud' (云监工). This kind of overseeing, which I call 'the gaze of the public', happens when enterprises live broadcast their production and transportation processes for the public to watch online. For instance, during the Double Eleven (双十一) of 2020, which is a shopping festival like Black Friday, there were about 100 million people watching the real-time streaming of 'the robots in the warehouses, trains crossing the Central Europe, giant cargo ships sailing to the ocean', as well as the workers along the assembly lines, provided by Cainiao and other logistics companies.[129] Something similar also happened when more than 50 million people oversaw the construction of Huoshenshan Hospital and Lenshenshan Hospital during the pandemic.[130]

Although for the viewers, it is just a new way of entertainment, it nonetheless implies a kind of power relations in the activities of seeing and being seen. As Weiss (1996) illustrates, 'those who look upon others are asserting an encompassing control over them, and must earn the authority that accompanies the privilege of this gaze' (p. 123). Thus, to be seen is to be prehended by the gaze of others. The robots, trains, ships, and workers in the first example, or the construction crews in the second, were made visible to the public and thus subject to their gaze. Especially for the workers, in this way, they were not only managed by the companies but also supervised by the public, whether they were aware of it or not. It is the case for everyone that whenever we post something online, we are under the gaze of others. However, 'those who look upon others' are also subject to the activities of seeing or overseeing; for example, either as a consumer of the video industry or by becoming part of the supervision or other activities that the videos are engaged with.

We are always under the gaze of others, but first, I argue, under the gaze of the algorithm. There are two consequences of this gaze of the algorithm: First, our behaviours are examined by it; second, it conditions whether and to what extent one can be seen or heard by others. It is true that expressing oneself becomes quite easy and common especially with the development of information and communication technologies. As Couldry asks, 'Don't we see everywhere a huge explosion of voice – in reality TV, magazine confessions, blogs, social networking sites – and the therapeutic industries that incite and manage this process?' Yet he further argues that voice does not only mean speaking or 'the growing incitements to speak' (Couldry, 2010, p. 113); or, I would add, the increasing instruments and spaces for speaking.

Although the Internet, particularly social media platforms, constitutes a landscape both for people to

[129] Zhoudaoshanghai 2020, 'The robot "199" gets popular, during the Double Eleven of Tianmao, there are 100 million people "cloud overseeing" logistics delivery', *QQ News*, 11 November, accessed 27 September 2022, <https://new.qq.com/omn/20201111/20201111A0EV6E00.html>.
[130] 'Revealing the most popular live broadcast of the year: the story behind the "cloud overseeing" of more than 50 million netizens', *Huanqiu*, 30 January 2020, accessed 27 September 2022, <https://china.huanqiu.com/article/9CaKrnKp7Bc>.

speak and in which they are heard (or not heard), as Norval (2007) argues, we should not

> Assume the existence of a framework … in which in principle every voice could be heard, without giving attention to the very structuring of those frameworks and the ways in which the visibility [and audibility] of subjects is structured' (p. 102).

Big data has been becoming an important structure for different frameworks or landscapes of voice. Specifically, in this section, I argue that the construction and dissemination of voice is increasingly mediated by big data. It concerns less the exclusion or inclusion of certain groups of people than the transduction, or even displacement, of voice by data. Voices are either made unnecessary or the value of them is prejudged by data to determine whether they could be heard. Although voice has not been or could not be completely replaced by data, and big data is just one among many factors that influences the producing and spreading of voice, the significance of this issue lies not only in the application of big data in urban management and commercial activities but also in people's daily engagement with it through social media.

With the development of social media and video technology, everyone's life has the possibility to be seen by others even though they are not seen equally. As Kuaishou themselves put it, 'Technology allows everyone to have the opportunity to express. Through the recommendation algorithm, everyone can hand out their content equally, [and] excellent creatives can get attention more easily' (Research Institute of Kuaishou 2020). Besides creativity, making a high-quality video often needs the support of a professional team and sufficient funds. More importantly, the algorithm could not directly judge the quality or creativity of a video. It could only know the number of views, 'Likes' and comments, average watching time, and so on. In this case, one possible result is that the more 'Likes' a video gets, the more it will be recommended and seen. On the other hand, the measure of how many times a video is watched, which is called 'traffic', has been commodified – users can buy it to increase the exposure rate of their videos. The gap still exists between influencers who have the resources to obtain a lot of traffic and ordinary people who do not. Although the Internet witnesses many stories about how an unknown person or unnoticed event suddenly get famous and draw a lot of attention for some reason, they are accidental events. Therefore, the distribution unevenness of attention still exists or even worsens under the content delivery system based on big data.

Of course, absolutely even distribution of attention is neither possible nor reasonable. Firstly, it is not commercially efficient; second, if every event got equal attention, there would be nothing which could obtain enough attention to give rise to changes. My aim is to indicate how big data participates in the distribution of attention and how it alleviates or worsens the distribution unevenness. Another notable phenomenon is that on Kuaishou or other platforms, when people find an event deserving more attention especially from the government, they will appeal to official news media or corresponding government agencies by 'referring to' (using the sign @) their official accounts on the comment box. It is supposed that only when news media notice and report the event will it get enough attention. This suggests that

even in the time of 'We-Media' (Bowman and Willis, 2003), when everyone can produce and share stories or news, the voice of ordinary individuals is still marginal compared with news media. On the other hand, the voice of the latter is also under the influence of big data to a greater or lesser degree. For example, how many people see that the content they post is also conditioned by big data, despite the power of their voice or the quality of the content.

Furthermore, I want to highlight the difference between being seen and being heard. Seeing and hearing are two different forms of sensing and understanding. In his anthropological research on Haya, a group of people inhabiting the north western corner of Tanzania, Weiss (1996) shows that for Haya people, although 'to hear' also means 'to feel' or 'to sense' in a general way, seeing is a more encompassing form of sensation in the sense that experience in its entirety could be apprehended by the act of seeing and that the ability to see is a means of control of the life by 'formulating subjectivities and engaging with the world' (p. 122). In addition, he further explains, 'It is the storyteller's ability to 'see' a story that can be communicated to an audience and actually enable the audience to see the story as well' (Weiss, 1996, p . 122, citing Seitel 1980).

On the contrary, I argue that to be heard is a more important indicator for the affective intensity of a story. To be seen is to be prehended, or to be exposed, while to be heard is to arouse sympathy, to resonate with the listener. As Ihde (2007) puts it,

> The voice of others whom I hear immerse me in a language that has already penetrated my innermost being in that I 'hear' the speech that I stand within. The other and myself co-implicated in the presence of sounding-word … [my] experience is always 'intersubjective'. (p. 118)

It is the story instead of the sound that immerses the listener. Being heard or not does not merely concern whether ones' sound could reach others' ears as an object appears in their vision but more importantly, whether one's voice can resonate in their heart and thus establish connection between the speaker and the listener. Therefore, by asking how people's voices could reach each other in the end of last subsection, I am also asking how this kind of connections could be possible especially during the big data era, which will be further addressed in Chapter 6.

So far, my discussion has only focused on an individual's voice while omitting other forms of voice. Couldry (2010) suggests that there are three cases wherein the value of voice and the forms for its expression would be undermined:

> When collective voices or institutional decisions fail to register individual experience; when institutions ignore collective views; when distributed voice is not reflected in opportunities to redeem voice in specific encounters. (p.10)

As for the influences of big data on collective voice, there are two questions to be answered. First, to what extent could big data represent collective voice? Second, would it make collective voice impossible by dividing individuals to a certain degree within its mechanisms of personalization? While

collective voice is made up of individual voices which can be identified, for Couldry, distributed voice is the form of voice in which there is 'no direct way of linking our particular inputs to outputs' and thus 'specific individual and collective inputs cannot easily be separated from a broader flow', which is the product of 'distributed networking', or 'distributed form of networks' (Couldry, 2010, p. 9, 101). I will turn to the implications of the development of big data for collective voice and distributed voice in the next two sections.

Section 5.3 A Split World

> Everything considers itself to be right and others to be wrong, itself to be beautiful and others to be ugly. Everything is what it is. The opinions of the one and the other are different; that they both have opinions is the same. — Kuo Hsiang.[131]

In this section, I investigate the influence of big data on the information people are exposed to, the divergence and polarization of individual opinions and the formation of public opinion and public space. There are both empirical and theoretical concern in this discussion. During the pandemic I noted that the divergence and conflict between opinions, beliefs and 'facts' were enlarged, and people found it increasingly difficult to communicate with others holding different opinions, who often used such terms as 'split world' and 'information cocoons' to characterise and problematize their life on social media and the Internet. It was believed that the development of information technologies leads to or exacerbates the phenomenon of 'information cocoons', which Cass Sunstein (2006), in one of his most famous books *Infotopia*, defines as the 'communication universes in which we hear only what we choose and only what comforts and pleases us' (p. 9). In an era when there is too much information for one to handle, the information we could obtain is limited to a certain range and largely technologically determined: First, nowadays people are more and more relying on the Internet, especially search engines and social media platforms, as their major information source; and secondly, the information delivery mechanisms, that is, what kind of information and the way how it is provided and presented, are increasingly depending on big data. As Abiri and Huang (2021) puts it, recommendation algorithms based on big data have become 'the prism through which we acquire information in our digital age' (p. 1).

Information cocoons and the societies of control

Of course, it is impossible for one to live in an absolute information cocoon since there are so many different information sources and we could get information through conversations with friends or

[131] Chuang Tzu and Fung Yu-lan 2016, *Chuang-Tzu: A New Selected Translation with an Exposition of the Philosophy of Kuo Hsiang*, Springer, London.

encounters with strangers. But we have become accustomed to accepting what the algorithms present or recommend to us even when we are actively searching for information as in, for example, the results Google Search provides for us being based on our past searching history. Indeed, the Council of Europe warned us that the personalised ordering and ranking of results shown by search engines can influence the diversity of information we could acquire (Zuiderveen Borgesius et al., 2016). Moreover, as more and more platforms present content based on users' preferences or subjectivities, there is the concern that people would be repeatedly exposed to the same kind of, or similar, information which 'suits' them. In the big data era, an information cocoon does not only refer to a group or a place wherein like-minded people are aggregated (Sunstein, 2006, p. 8); rather, it seems that everyone has become an information cocoon themselves in so far as one hears and could hear only what they like or what represents who they would like to think that they are. I understand the term information in a way similar to how Couldry and Turow (2014) understand knowledge, that is, as 'shared reference points that […] enables us to recognize each other as members of a common social and political space' (p. 1719). Couldry and Turow (2014) further argue,

> big data's embedding in personalized marketing and content production threatens the ecology of connections that link citizens and groups via information, argumentation, empathy, and celebration as members of a shared social and civic space. (p. 1710)

The personalization of media content is also the fragmentation of the public sphere because the former could undermine people's recognition of others as living in a shared public space.

Here the investigation into the influence of big data on public space, as well as public opinion, is related to our discussion of Deleuzian societies of control. By reference to Gabriel Tarde, Lazzarato argues that the problem fundamental to the societies of control is about 'the formation of publics, that is to say, the constitution of a being together that takes place in time'. Tarde understands the public as 'a dispersed crowd in which the influence of minds on one another has become an action at a distance' (Lazzarato, 2006, p. 179-80). As such the public is defined as 'a highly deterritorialized socius' (Terranova, 2007, p .138). For Tarde, the relations between individuals and publics are neither exclusive nor fixed: One could belong to different publics at the same time, and publics are always in their constitutive and evolving dynamics (Lazzarato, 2006, p. 181). A public, always shifting and changing, is a temporal effect of a brief encounter of individuals affecting and being affected by each other, or to use Terranova's words, 'a provisional event that does not exhaust, but multiplies the chances for the re-invention of possible shared worlds' (Terranova 2007., p. 142). Moreover, it is formed through 'the cooperation between brains', either in the form of public opinion or collective perception and collective intelligence (Lazzarato, 2006, p. 181). For Lazzarato, public opinion, as well as other machines of expression, increasingly becomes 'the strategic locus for the control of the process of constitution of the social world' (p. 180). Publics and public opinions are, on the one hand, the institutions through which the multiplicity of singularities is captured, and on the other hand, act as 'counter weapons' against such

processes of capture, which, 'by expressing, inventing and creating possible [shared] worlds', create the possibilities of resistance and affirmative activities (Terranova, 2007, p. 140). I argue that big data makes the processes of the proliferation and segmentation of publics go further to the extent that the constitution of publics is not necessary or possible, because the singularities do not need to be captured as a whole, but could be captured one by one, singularity by singularity.

There are two ways in which big data could influence people's beliefs, values, and opinions: by participating in the production of knowledge and truth(fulness), and by affecting the information one could access or be exposed to, particularly from the Internet, as I have discussed in Section 5.1. Previous research has shown how big data techniques are employed in targeted marketing to affect public opinions and political behavior, especially in political campaigns (see, for example, Chester and Montgomery (2017) and Nickerson and Rogers (2014)). But the influence of big data on public opinion should not be understood simply from the perspective of whether it incites or discourages certain opinion, for example, of supporting a certain president candidate instead of the other. Think about the huge number of videos on TikTok or Kuaishou,[132] most of which are produced and uploaded by users themselves. It is impossible to predict where they would direct individual and public opinions to under the content delivery mechanisms of big data. The influence of big data on the construction and transformation of public opinion is usually ambiguous, directionless, and unpredictable. We only know there is constant modulation of the information one is exposed to, which is not marketing-oriented all the time.

Thus, my research focus is less on the influence of big data on the orientation of public opinion than the difficulty in the constitution of public opinion. Would big data, by conditioning and personalizing the information people are exposed to, intensify the divergence and conflict between individual opinions to the extent it is almost impossible for public opinion to form and develop? Here public opinion is not understood as the homogenization or aggregation of individual opinions but as a kind of social action which requires the communication and cooperation between minds. As Krivý (2018) argues, today social action has been increasingly about becoming communicative, which is concerned less about collective decision-making than the adjustment of public opinion by 'capturing attention, raising awareness, inciting feelings of desire and guilt, nudging towards a different lifestyle and changing behaviour' (p. 20). Public opinion then, as social action, has to be formed and rooted in communication or conversation, the latter of which is, in Lazzarato's words, 'the living environment, the collective assemblage within which desires and beliefs are formed' and thus 'the expressive condition of the formation of any value' (Lazzarato 2004, cited in Terranova, 2007). Although the Internet and social media provide spaces for people to express and communicate, it also seems that big data and other

[132] For example, by the end of 2018, there were more than 15 million short videos uploaded every day, and in total more than 8 billion on Kuaishou. See 'Kuaishou has more than 160 million daily active users and 300 million monthly active users', 10 January 2019, accessed 28 September 2022, < https://tech.qq.com/a/20190110/012226.htm >.

digital technologies reinforce the entrenchment and polarization of opinions and thus hinder the communication between people with different opinions – public spaces are not already there but have to be created.

It would be an extreme scenario wherein people's opinions were so divergent that even they could not communicate with one another. But people do find that communication becomes more and more difficult in a digital age, with the development of social media and big data. I do not intend to argue whether the phenomenon of information cocoons exist. The recommendation or personalisation algorithms are themselves a kind of proof for it. Rather, I suggest that the term 'information cocoons' gives people a vocabulary to characterise and problematize their social life experiences when they observe huge differences between different opinions of different people; although in some cases it also becomes a weapon for people to criticize against others by saying, for example, 'Your opinion is too biased because you are in an information cocoon'. If individual voice is to some extent displaced by data, and collective voice becomes difficult to develop, is distributed voice a more possible form of voice in this big data era?

From public opinion to public (in)attention

Couldry (2010) suggests that when we recognize our inputs in a collectively produced voice, it is called 'collective voice', whereas when 'specific individual and collective inputs cannot easily be separated from a broader flow' in the production of voice, when 'we have no direct way of linking our particular inputs to particular outputs', this form of voice is called 'distributed', which is characteristic of 'all networks, and much online production'. He takes 'buycotts' or consumer boycotts as an example of distributed voice, as compared to the collective voice of fan communities or user groups. It is the production of voice in the distributed networking, which is also decentralized, de-hierarchized, self-generating and self-organizing. But when and how a distributed voice, as distribution of inputs and outputs, can be count as voice? He further argues that a distributed voice has to be 'redeemable' or 'translatable' to be effective:

> a distribution of inputs and outputs cannot qualify as voice unless the expression-tokens which emerge from it can be translated at some point into specific processes of speaking and listening that plausibly stand in for the countless individual acts of speaking and listening that underlie them.

By expression-tokens, he means the 'abridged token arguments' standing for more direct and explicit debates (Couldry, 2010, p. 12, 101-3). In the context of a political campaign, for example, expression-tokens could be the rhetorical statements or promises of a candidate and their redeeming requires 'respond[ing] to demands for clarification, specification, and evidence to the satisfaction of an audience that shares many of the speaker's values and presuppositions and relies on these common meanings to fill in the blanks' (Mayhew 1997, p. 13). However, I argue that the essence of distributed voice lies in

its ambiguous status of that between redeemable and unredeemable, between being redeemed and not redeemed.

In the time of social media and attention economy, actions such as Like, Dislike, following, posting and reposting, sharing, commenting, mentioning (@ someone), hash-tagging (#), adding to the Favourites, and even watching and reading have become a kind of political or social action. People also realize the power, no matter how marginal, of their small actions. For example, when they believe an event or issue deserves more attention, people might post and repost or comment on it, by saying 'Let's make it one of the Top Trends'. There is an expectation behind such actions that if a post could draw enough attention from the public and then from the government, the problems it delivers would be resolved to some degree. Normally, if an event keeps simmering on social media, it will end with a government bulletin informing the results of an investigation of the problems involved and the measures taken. The Internet has witnessed how many events occur, attract attention, disappear and become forgotten in such a way. The releasing of government bulletins, as well as the responding of the public to them (supporting, criticizing or doubting but without directly communicating with the government), is the moment of the redeeming of the countless individual acts of posting, reposting, commenting and so on. In this case, public opinion is reduced to the data about how much attention is drawn to a certain event (or more specifically, how many times a post about it is read or watched), as well as the statistical analysis of the frequency of relevant key words mentioned on social media, especially in so-called 'public opinion monitoring and analysis' (Li, 2010).

For certain specific events, it might be not a bad thing for them to attract public attention to promote the government to make some changes – too much attention could be a burden for people involved, but there are also many other events which could not make a splash and quickly disappear on the social media. Moreover, this mode of public supervision on social media undermines the value of public opinion as the result of the communication and cooperation between different minds. Although those numerous actions of posting, reposting, commenting, responding and so on could be considered as a way of communication, there is the lack of the real connections and conversations based on which public opinions could form and develop. In a nutshell, public attention displaces public opinion.

It is attention and memory that are directly controlled and modulated, as Lazzarato would suggest. For him, in the societies of control, the objects of control are life and the living, not life as 'the set of biological characteristics of the human species', as in the case of biopolitics, but life as memory. He thus quotes Margulius and Sagan (2002):

> The essence of the living is a memory, the physical preservation of the past in the present. By reproducing themselves, the forms of life bind the past to the present and record messages for the future. (Lazzarato, 2006, p. 184)

The forces of memory and its *conatus* – attention, that is ''mobilised by the cooperation between brains'

to make the flows of desires and beliefs circulate, are also what information and digital technologies capture and modulate to intervene in the cooperation between brains. Apparently, for digital technologies it is less difficult to modulate attention than opinions, either individual or public, since the easiest way to attract one's attention is to continually give (or feed) them the information they are interested in and in a variety of media forms (i.e., text, images, audios, and videos). This is the purpose of algorithmic personalization and recommendation (Couldry and Turow, 2014).

Through the discussion of the industrialization of temporal objects (e.g., videos), Stiegler makes clear the relationship between consciousness, attention, and digital technologies:

> The coincidence of the time of the industrial temporal objects' flow with our consciousnesses has the consequence that, in making them our objects of consciousness, that is, of attention, we embrace and adopt their time, we adhere to them in such great intimacy that they come to substitute themselves for the proper temporalities of our consciousnesses. (Stiegler 2004, quoted and translated by Roberts, 2012, p. 18)

I argue that in a big data age, under the flow of media contents presented to us, there is further the flow of data which conditions the presenting and ordering of these contents and thus the temporalities of our consciousness. On the other hand, I argue, digital technologies have not just been used to influence where we focus our attention but could make us focus almost on nothing through the increased banality of a personalized, never-ending stream of news and entertainment, making us forget something they we once believed important. For example, on such short video platforms as TikTok where a video could be as short as less than 10 seconds, we could be so immersed in those videos but do not really focusing upon something – everything just passes in and out of the consciousness. Although we can observe at a certain moment a lot public attention, which seems to become a kind of public resource in these times, where we become attracted to a certain event, people quickly forget what it was about as their attention is drawn to other things. Simply put, if big data can direct one's attention through a personalized presentation of media content, by doing so it can also make attention become increasingly focused upon nothing meaningful (meaningfully new or stimulating or significant etc). This is another way for controlling and modulating the attention.

But for a counter strategy against such capturing of public opinion and public attention, I suggest we should turn back to the constitution of publics (or maybe better, public spheres) as provisional events that, to cite Terranova (2007) again, 'multiplies the chances for the re-invention of possible shared worlds' (p. 142). This is how I understand publics (or communities) as possible shared worlds where 'unplanned, unanticipated encounters' (Sunstein, 2002, p. 9) could happen. Both adjectives are important here: *Shared* does not refer to consensus but means that we have 'some sharing of experience – of information, argumentation, clarification, empathy and celebration' (Couldry and Turow, 2014, p. 1722); and *possible* means the increasing possibility of these experiences, which occur in and through encounters and communication, either anticipated or unanticipated, between different people.

What we need to do is to recollect and rebuild the connections, or rather ecologies of connections, in

which different information, knowledge, opinions, values and feelings could circulate and be shared and exchanged, and through which different 'actions and discourses [or voices, I prefer] for producing commonality' (Rosanvallon, 2006, p. 250) could be generated. These voices do not necessarily appear as public opinions waiting to be responded to by the government but are simply the voices of the conversations between different people. They are not individual, collective or distributed because we cannot distinguish who is speaking and who is listening; there are only voices. In other words, there are countless acts of speaking and listening where no singular identifiable subject speaks or listens.

I argue, this is a world, or worlds, full of voices. Are not the voices already there? But we characterise someone as this or that kind of person because she says this or that kind of thing; and we take what we have said or what we are going to say so seriously that we believe we cannot say something different or in a different way. We hold on to our opinions too tightly, while we forget that we do not possess the opinions that we think we have, but they possess us. However, if we could ever remember a moment in which we were so immersed in a conversation with others that we even forgot about ourselves and that we cared less about who was right and who was wrong despite the difference of opinions, we would know that the subject 'I', as well as the boundary between 'You' and 'I', did not always exist and that those voices and words just came out on their own.

I suggest that we need more public and social spaces for speaking and listening, which do not already exist like a social media platform or an online forum but have to be created and recreated all the time. They do not need to (and should not) be institutionalised, but occur from an event, a process, organized or non-organized, such as an online lecture, an art exhibition, a causal group chat, or two strangers suddenly talking with each other for no reason. However, I am not naively suggesting that simply by encouraging people to communicating with each other could we deal with the problems and challenges brought by big data. For, as noted by Taylor (1984), the very notion that we have an identity to express could be 'part of the dispositif of control rather than as what defines our liberation' (p. 163). Rather, as will be further discussed in Chapter VI, by taking speaking as a method against data, I leverage an approach which I attribute to Foucault, as well as Deleuze and Guattari, and for which speaking (and listening) represents a kind of stylization of life – in a Foucaultian sense of this term – that make possible unexpected, unplanned connections and encounters with something new or different. As Foucault himself argues, the stylization of life, or 'aesthetic of existence', does not concern one's relation to oneself but also to others (Foucault et. al., 1983). It is from this perspective that I relate the influence of big data on urban management and everyday life to the creation of different ways of being-together.

Furthermore, here I am against any institutionalised attempt to rebuild the connection between people while arguing for the productivity and spontaneity of events – in which the relations between people are created and recreated. Simply put, we need events but not institutions. I call a group of people, dispersed or gathered temporarily, and connected through events, a public (or a community), not as a

socio-political group but as what Foucault calls ‘a generator of de-individualization’ in his preface for Deleuze and Guattari’s *Anti-Oedipus* (Deleuze and Guattari, 2009, p. xiv). What we need is the production of events that multiplies the chances of unplanned, unexpected encounters and the possibilities of being-together, which aims not to produce certain kinds of subjectivities to bring about corresponding socio-political actions but to construct networked terrains where a variety of voices and actions and their exchange are made possible and curated.

The forming of public spaces does not only require these events that bring people together but also the communication and cooperation between different minds. I am highlighting the value of those events, no matter how small they could be, which creates and recreates the connections (and disconnections) between people, and of the mutual recognition, support, help and cooperation established on such connections, especially in a time when we feel the divergence between different people is growing, public opinions are more and more difficult to develop and social actions more and more rare. The events are temporary, so are the connections. They are always being created and recreated. Therefore, no one would ever belong to any group; there are only encounters. This will be further discussed in next Chapter.

In this chapter, I discussed the relationship between data and voice, with a focus on the big data recommendation algorithms of short video platforms. Not only is people’s engagement with these platforms increasingly personalised and individualized but the whole cyberspace with the popularization of big data. First, I argued that by participating in knowledge production not only in academic research but more importantly, in everyday life, big data to some extent undermines the value of voice. Then, through the recommendation mechanisms, big data, on the one hand, conditions the information one is exposed to on social media and thus his or her opinions and on the other, the extent to which one’s voice could be heard by others. Finally, I argued that by controlling and modulating attention, big data affects public opinion and public attention and, in some cases, even make them impossible to develop. In many ways these issues illustrate that big data works on and through the production of subjectivity, as discussed in Chapter II. Following last chapter, this chapter continues to discuss the relation between humans and digital technologies within the context of the digitalizing society of China, from the perspective of co-constitution and the relationship between individuation and dividuation. On the one hand, the digital trace of humans becomes the operating condition of platforms relying on big data to deliver media content; on the other, big data increasingly determines what kind of information one has access or is exposed to in an era of social media – yet this is not only a process of individuation as it could constantly modulate our attention to the extent that we almost focus on nothing. The key issue is not the recommendation of information according to one’s preference or subjectivity but the incorporation of memory, attention, and opinion as ‘dividuals’ into larger socio-technical machines serving or not targeted-marketing activities. Moreover, this chapter highlights the agency of data itself which to some extent undermines the value of both individual and public voice. It

is especially for the digitalizing society of China where short video platforms become important space for people to get information, express opinion, and communicate with each other while the entertainment function conceals their political consequences.

Turning to Lazzarato's noopolitics, I further linked the conditioning of voice by big data back to Deleuzian societies of control and at the same time, argued that the problem about voice is also that about the ways of being-with-each-other in the big data era. In the next chapter, I will discuss how different relationships with digital technologies could make different ways of being-with-each-other possible.

Chapter VI. Becoming a Digital Nomad

In last two chapters, I explored the development of the smart city and short video media in China, which offers opportunities to investigate the relationship between humans, digital technologies, and cities in a big data era. I discussed the implications of these technologies in relation to two main themes: the ways of life and those of being-with-others in the big data era. I argued that being as data is the new way of being and living in the world, which does not only mean the datafication of our behaviour, movement, and activities but also being as 'dividuals' for different social-techno-datalogical machines within and between which we exist and live. Furthermore, it is through and as data, which influences the processes of speaking and hearing especially on social media, that we are connected with each other, and the 'we' is constituted, as in the case of public opinion or public attention, not through the mere addition of individuals but rather, by the identification of the correlations within and between data. As Rouvroy and Berns (2013b) puts it,

> All that counts are relations between data, which are merely infra-individual fragments, partial and impersonal reflections of daily existences that datamining [which here means the process of identifying correlations between data] makes it possible to correlate at a supraindividual level, but that indicate nothing greater than the individual, so no people. (p. XXVII)

But, against the conditioning of ways of life by big data and other digital technologies, and the processes of 'dividualisation' or machinic enslavement they effect, should we need to develop alternate modes of (collective) individuation, as Stiegler would suggest (see Hui and Halpin, 2013, Vesco, 2015)? Or, as Celis Bueno (2020) drawing on Deleuze and Guattari argues, 'we should appropriate the deterritorializing tools that the same technology has made possible in order to imagine a post-humanist future' (p. 88)? That is to say, in Foucault's words, should we employ digital technologies as 'a constant generator of de-individualization' (Deleuze and Guattari, 1977, p. xiv) to create different ways of life and being-with-others? This is the job of this chapter, to rethink the relationship between humans, technologies, and cities.

Stiegler, Deleuze, Guattari, and Foucault all observe that the development of modern technology and capitalism would lead to dividualisation or (both psychic and collective) disindividuation. Of course, there are differences between dividualisation and disindividutaion. For Stiegler, disindividuation implies that 'the individual has lost its capacity to individuate both psychically and collectively', for example, in relation to targeted marketing and personal recommendation in which 'the subject loses the possibility to doubt what is given and to develop his or her own judgment' (Hui, 2015, p. 86). Moreover,

this disindividuation is not only destructive to individuals but also of groups by destroying the public and public life, making the 'we' (collectivity of singularities) of into the 'they' (mere buying-power) (see Stiegler, 2006, Hui, 2015, Vesco, 2015). It, on the one hand, implies the 'synchronization of consciousness' and thus a decomposition of style or singularity (Vesco, 2015, p. 100), effected by marketing and advertising activities or/and digital technologies, and on the other, the lack of love for or attention to oneself and others (Stiegler, 2006).

However, dividualisation, or de-subjectivation, highlights the process of the decomposing of the subjectivity and the incorporating of its components into different socio-technical machines (Lazzarato, 2014). Individualisation and dividualisation are two different yet interdependent processes which are combined and employed together in the machinic production of subjectivity such as effected by digital technologies, while, at least for Stiegler, individuation is completely opposite to disindividuation.[133] On the other hand, as Hui (2015) suggests, in disindividuation, individuals are reduced to mere buying-power or mere data, and thus it implies that what marketing or digital technologies target are no longer individuals but 'dividulas'. Although dividuation focuses more on how power works on and is enacted through the component parts of subjectivity instead of individuated subjects, it also implies the inabilities of individuals to question the settings of the socio-technical machines in which they are 'enslaved'. Therefore, disindividuation and dividualisation are two different yet related aspects of the same process in which the human no longer exists as individuated or individualised subject.

In relation to this process, Stiegler, Deleuze, Guattari, and Foucault propose different solutions. For Stiegler, the solution is to search for new ways of collective individuation, one example of which is the project that he, Harry Halpin, and Yuk Hui started in 2012 for a new concept of social network different from Facebook (Hui and Halpin, 2013), while for Deleuze and Guattari, as well as Foucault, this collective individuation is not necessary or even not desirable. As Foucault writes in the foreword for Deleuze and Guattari's *Anti-Oedipus*,

> The individual is the product of power. What is needed is to 'de-individualize' by means of multiplication and displacement, diverse combinations. The group must not be the organic bond uniting hierarchized individuals, but a constant generator of de-individualization. (Deleuze and Guattari, 1977, p. xiv)

Therefore, instead of collective individuation, they suggest that what is needed is collective dividualization or de-individualization.

More inclined to the second approach, I further engage with Foucault's discussion of the 'aesthetic of existence', for whom a life must 'be created as a work of art' (Foucault et al., 1983), to discuss the problem of the stylization of life in the digital era, which aims not to produce a certain kind of subject or smart citizenship, but to create different ways of living with each other, with or without various

[133] For Simondon, disindividuation is a necessary stage for individuation, whereby a metastable equilibrium is destroyed in order to construct a new one. See Hui, Y., 2015. Modulation after control. *New Formations*, 84(84-85), pp.74-91.

digital technologies, as Foucault suggests that the stylization of life could 'assume the far more radical form of a being free of one's own self, a non-identity or de-subjectification' (Huijer, 1999, p. 78). Nonetheless, although Foucault would like the stylization of life to be manifested in more enduring relationships (e.g., friendship or love), I follow Nietzsche, in terms of his understanding of the transience of the encounter between people, to rethink the ways of living in the digital era. This leads me back to Deleuze and Guattari: I consider 'becoming a digital nomad', which is both a figure derived from the work of Deleuze and Guattari (1987) and an emerging way of life in the digital age, as both a slogan for and a general way and attitude of living with digital technologies, exploring new possibilities and events, and making new and maybe temporary connections.

Digital nomad as an aesthetic of existence

In an interview with Hubert Dreyfus and Paul Rabinow, which is transcribed into *On the Genealogy of Ethics*, Foucault asks, 'But couldn't everyone's life become a work of art?', in response to the question of 'what kind of ethics can we build now' (Foucault et al., 1983, p. 236). He further argues that 'the principle [sic] work of art which one has to take care of, the main area to which one must apply aesthetic values is oneself, one's life, one's existence'. A life, or a self, is not what needs to be discovered or deciphered from our inner world but must 'be created as a work of art', or be stylized (Foucault et al., 1983, p. 245). The aesthetical requirement of life is also ethical in the sense that only by making one's life 'a thing of beauty', by 'respecting the constraints of true needs and their hierarchies' could one become a moral subject (Flynn, 1985, p. 535). This is reminiscent of the discussion in Section 3.3 about traditional Chinese philosophy of technology, for which living a moral or good life, that is a life which achieves the harmony between humans and the cosmos, is essential to the using and making of technics.

In response to the last chapter, where I argued that data is increasingly replacing voice so that one even 'no longer has to conceive of or express his or her desires' (Rouvroy and Berns, 2013b), I understand the stylization of life as a method to *speak against data* (pace Elden, 2019). Here I define speaking as not merely the giving account of one's life but the self-making, or self-improvising of life. It is life itself that speaks. As such speaking is truth-telling (*parrhesia*), not in the sense of 'the Socratic-Platonic care of the soul', the self-discovery, or the Heideggerian *aletheia*, the unconcealment (see Elden, 2019, p .78-9), but in relation to the stylization of life and the commitment and courage to live it (Flynn, 1985, p. 537-8). As Flynn notes,

> Foucault sees Plato at the crossroads of two concepts of truth-telling [...] The one form of 'rendering an account of oneself' comprises a care of the soul such as Socrates enjoined upon his fellow citizens […] The other form concentrated on what one ought to do, on the art of living a life other than that of the popular mores. (Flynn, 1985, p. 537)

It is in the sense of speaking that I understand the stylization of life as an approach to fight against big

data and the machinic production of subjectivity through it. And it is in this era when big data largely conditions our life that the problematization of the stylization of life is especially important.

However, in such stylizing of life, it does not require a certain kind of subject or citizenship that is 'smart' enough, able to employ various kinds of digital technologies to create a better life, or that is not confined by the options and opportunities provided by big data and lives their own way. Foucault suggests that the stylization of life could 'assume the far more radical form of a being free of one's own self, a non-identity or de-subjectification' (Huijer, 1999, p. 78). The subject, at best an effect rather than cause of the stylizing of life, is just 'a dominant desire that at [a certain] moment takes the helm' and only attenuates or dissipates in the next moment (Hynes and Sharpe, 2015, p.77). Foucault further suggests the necessity to pursue the stylization of life in our being-with-others (Huijer, 1999, p. 79), in which the temporality of the so-called subject is more obvious. For the aesthetic of existence does not only concern a relationship of one to oneself but has to be established in their relations to others (other humans, animals, technical objects, and so on) as well as with the world.

For Foucault, the pursuit of the stylization of life in our being-with-others, such as in the friendship, is 'the pursuit of a (temporary) balance between self-preservation and self-loss' (Huijer, 1999, p. 74). As Huijer remarks,

> In Foucault's work, as in Nietzsche's, problematizing feelings of friendship served as an important motivation for pursuing a stylization of life. Finding an equilibrium between self-loss and self-preservation has turned out to be a complicated game with idealization, memory, fantasy, transience, sadness, self-control, intimacy and distance all playing a role. In this animated entirety - with the subject constantly at stake - it seeks a way to create itself that transcends the automatism of everyday reality. (Huijer, 1999, p. 74)

I read this balance as a state in which we can veritably feel our own existence and then immediately forget it and lose ourselves. Drawing on Guattari's (1980) example of 'driving a car in a dreamlike state' which he employs to illustrate the machinic enslavement subconscious, I want to use the example of chatting with friends in a tipsy state when even we ourselves do not know what we have said or what we are going to say, as '[e]verything functions outside of consciousness; it's all about reflexes, one's mind is elsewhere, almost even asleep' (Guattari, 1980, cited in Rouvroy and Berns, 2013a, p. 14), but at a certain moment, we realize that we are drunk or not yet, to show how such 'a (temporary) balance between self-preservation and self-loss' is possible.

Although Foucault would like the stylizing of life to be manifested in more enduring relationships (e.g., friendship or love), I turn to Nietzsche for his highlighting of the transience of the confrontation with others. The encountering between people could be very short and temporary, which could be compared to the meeting of 'two stars momentarily in one and the same orbit':

> [O]ur paths may cross and we may celebrate a feast together.… But then the almighty force of our tasks drove us apart again into different seas and sunny zones, and perhaps we shall never see each other again. (Nietzsche 1988, cited in Huijer, 1999, p. 74).

This kind of transient confrontation could be well exemplified by the encounter of people, especially that of strangers, on social networks. For Nietzsche, this transiency is not regrettable since we could attain the command of ourselves in solitude or seclusion. But I argue it is in these transient encounters that we find a way of living and being-with-others. Although not every encounter is equally meaningful, we could explore for more possibilities of life in them.

Here I am using Foucault and Nietzsche's discussion to contemplate a possible escape from the digital production of subjectivity and society of digital control, for which I think 'becoming a digital nomad' could be a slogan. According to Wikipedia,

> Digital nomads are people who live in a nomadic way while working remotely using technology and the internet. Such people generally have minimal material possessions and work remotely in temporary housing, hotels, cafes, public libraries, co-working spaces, or recreational vehicles, using Wi-Fi, smartphones or mobile hotspots to access the Internet. Some digital nomads are perpetual travellers, while others are only nomadic for a short period of time. While some nomads travel through various countries, others focus on one area. Some may engage in van-dwelling.[134]

I am not suggesting that everyone should work remotely using the Internet. Neither does I take the digital nomad as a kind of identity or subjectivity to be developed among citizens. First, it is an identity based firmly or loosely around 'working' and the capitalist values attached to it – one is not a digital nomad if he or she is not working. Second, the digital nomad as it is defined by the Wikipedia or expressed on social media is precisely a kind of neoliberal entrepreneurial subject (see Cook, 2020, Reichenberger, 2018, Thompson, 2019) that Foucault's stylisation of existence would precisely set itself against. Rather, I consider becoming a digital nomad as a general way and attitude of living with digital technologies. In relation to Nietzsche's discussion of the transience of the encounter, I use it as a methodology for the exploring and creating of new events and possibilities and making new and maybe temporary connections (not only with people but with nonhuman agents such as technical objects) in everyday life which is increasingly influenced and mediated by big data and other digital technologies.

It is here that I turn back to Deleuze and Guattari (1987) in terms of their concept of 'the nomad' and its powers of deterritorialisation. For Deleuze and Guattari, the nomad is not defined by the literal act of travelling or movement:

> The nomad distributes himself [sic] in a smooth space; he [sic] occupies, inhabits, holds that space; that is his [sic] territorial principle. It is therefore false to define the nomad by movement. Toynbee is profoundly right to suggest that the nomad is on the contrary *he* [sic] *who does not move*. (Deleuze and Guattari, 1987, p. 381, emphasis in original)

Rather, the nomad is a metaphor for the 'deterritorializing force of processes of becoming' (Braidotti, 2014), which proliferates and redistributes singularities and events. Purcell (2013, p. 26) gives a brief yet clear explanation of what 'deterritorialization' means for Deleuze and Guattari: 'An apparatus of

[134] Wikipedia 2022, *Digital nomad*, 16 November, accessed 18 November 2022, <https://en.wikipedia.org/wiki/Digital_nomad>.

capture holds us at a fixed point, but when we escape the apparatus we begin moving along a line. We begin a process of becoming something other, something new.' Therefore, as Wuthnow (2002) notes, the nomad directly linked to the notion of the 'body without organs', which is 'permeated by unformed, unstable matters, by flows in all directions, by free intensities or nomadic singularities, by mad or transitory particles' (Deleuze and Guattari, 1987, p. 45). Smith (2018) further suggests that the body without organs is what a body is attaining when a part of it 'enters into combination with some other machine [or body] in a way which allows it to escape from the organism's regularizing, normalizing processes', to produce new singularities and events (p. 109). Much like the body without organs, Wuthnow (2002) argues that the nomad is 'unmarked, unlocatable and disembodied' and could only be grounded in the intensities of becoming (p. 186). It is in this sense that we can say the nomad is 'constituted by continuous shifts and changes' and that it constantly 'passes through, connects, circulates, moves on' (Tamboukou, 2021, p. 7).

Living in a nomadic way with digital technologies, for me, is a kind of 'aesthetic of existence' in a big data era. It requires a rethinking of the relations to digital technologies and the ways of life. Yet it aims not to produce a certain kind of 'nomadic' subjectivity. The focus is far more on the production of events and connections in which one could even be free of one's own self or in an equilibrium between self-preservation and self-loss. As Braidotti (2011) puts it, 'nomadic shifts designate, therefore, a creative sort of becoming, a performative metaphor that allows for otherwise unlikely encounters and unsuspected sources of interaction, of experience and of knowledge' (p. 27). The reason why I do not directly jump to Deleuze and Guattari's nomadism, but rather make a detour through an engagement with Foucault and Nietzsche is that I want to highlight becoming a digital nomad as a 'line of flight' (Deleuze and Guattari, 1987, p. 9) or an escape – as Purcell (2013, p. 26) says, 'we begin moving along a line – is about exploring different ways of life in our being-with-each-other and at the same time, *speaking against data* through life itself. In the rest of this chapter, based on online materials, I illustrate what becoming a digital nomad means in the context of China through a case study of how citizens saved themselves through social media and other digital platforms during the longest lockdown of Shanghai.

Connecting and grouping together through digital technologies

As discussed in previous chapters, a most notable characteristics of the digitalizing society of China is the symphony composed of the ubiquity of digital technologies in urban management and everyday life and the social unconscious towards it. I argue that the technological unconsciousness is also political unconsciousness. In response to this, the question is, whether what is needed is to develop a certain kind of technological consciousness and thus digital subjectivity or smart citizenship. From the story of the

lockdown in Shanghai, I find that there is another way to build different relationship with technologies which does not necessarily appeal to such kind of technological consciousness. First of all, the lockdown created a special space-time in which many of the convenient, digital modes of life were disrupted or made impossible but at the same time, new ways of life were created because of the restriction of mobility, and which thus enabled us to rethink the relationship between humans and digital technologies. Second, in relation to the discussion in Section 3.3 that especially from the perspective of cosmotechnics in China, the question/philosophy of technology is also that of life, to rethink the human-technology relation in a big data era is to live differently with digital technologies, to make new, unexpected encounters and connections through or not through them. This is what I learn from the Shanghai lockdown.

Shanghai is one of the biggest cities in China, with a population of about 24.87 million in 2020, according to *the Seventh National Population Census*.[135] In the first half year of 2022, there was a rampant outbreak of the Covid-19 in Shanghai started from early March. The number of infected persons maintained rapid growth and on April 7, daily new cases exceeded 20,000.[136] During the period between March 1 and May 30, when the number of daily new cases hit the lowest since March 5, the total number of infected persons in Shanghai reached at 626,808.[137] Before this outbreak of the Covid-19 in Shanghai, up to February 28, 2022, there were less than 110, 000 reported confirmed cases in total in mainland China.[138]

As discussed in Section 4.3, the development of the Health Code 'saved' people from the lockdown occurring in the earlier stage of the pandemic, but whenever there was the possibility of an outbreak, many cities would go back to lockdown, whether regional or city-wide, which seemed to be the safest measure. To control the spread of the pandemic, on March 27, the government of Shanghai first decided to implement alternate lockdown:

> Starting from 5:00 on March 28, Shanghai will conduct the Covid-19 screening region by region, batch by batch with the Huangpu River as the boundary. The first batch, Pudong, Punan and their adjacent areas will implement lockdown first, carry out the Covid-19 screening, [and] the lockdown be lifted at 5:00 on April 1. […] Start from 3:00 on April 1, the second batch, Puxi will implement lockdown, carry out the Covid-19 screening, [and] the lockdown will be lifted at 3:00 on April 5.
>
> Within the lockdown areas, all residential neighbourhoods shall be under closure and control, all people stay at home, [and] all persons and vehicles can only enter but not exit. The delivery of food, packages, etc., which are

[135] Shanghai Statistics Bureau 2021, *The Bulletin of the Main Data of the Seventh National Population Census in Shanghai*, 18 May, accessed 18 November 2022, <https://www.shqp.gov.cn/stat/stat/upload/202105/0518_135539_717.pdf>.
[136] Shanghai Municipal Health Commission 2022, *Shanghai Municipal Health Commission Website*, Shanghai Government, accessed 18 November 2022, <http://wsjkw.sh.gov.cn/rdhy/20220409/a9f9a5d476a54b3ebd941a4bd1eb40f5.html>.
[137] Han, Y 2022, '29 new cases in Shanghai on May 30, the lowest since March 5', Caixin, 31 May, accessed 18 November 2022, <https://www.caixin.com/2022-05-31/101892498.html>.
[138] National Health Commission of China 2022, 'The latest situation of the Covid-19 as of 24:00 on February 28', 1 March, accessed 18 November 2022, <http://www.xinhuanet.com/politics/2022-03/01/c_1128425267.htm>.

necessary for basic living demands, shall be conducted without contact, [and the deliverers] are not allowed to enter residential neighbourhoods […].

While working, medical staff, epidemic prevention personnel, public security officers [i.e., policemen], food and package delivers shall travel normally with work permits or enterprise certificates; all enterprises shall carry out enclosed production or working from home, except for public service enterprises […]; public transportation, subways, ferries, taxis and online car-hailing will be suspended. Vehicles related to epidemic prevention and control, medical emergency, supplies, city operation, emergency response, etc., could pass [within the city] after the approving and verifying of the district governments or the competent authorities of each industry, [while] other vehicles shall not be on the road unless necessary. [139]

However, with the worsening of the situation, the lockdown did not end quickly as people expected. On April 1, Shanghai entered the 'static management of the whole city' (全域静态管理), that is complete lockdown.[140] It was not until June 1 that Shanghai resumed public transportation and allowed private vehicles to get on the road and residents to get in and out of the neighbourhoods, except for those living in high-risk areas and other specified areas which were still under lockdown.[141]

This was a time when, as remarked by a media article, 'the urban life that used to be normal has become out of reach'.[142] Because of the strict control over the movement of people and vehicles, the ways of life such as those I mentioned in Section 4.1 (i.e., scanning to pay, online shopping, bike sharing, car-hailing, food and package delivery, etc.) became impossible or largely limited, which had been so convenient because of the development of digital technologies. The Health Code also became useless as people were not allowed to go out unless for doing Covid tests. In a sense, the city went back to Foucaultian disciplinary society (Foucault, 1995) in which a centralized mode of governance displaced the distributed, decentralized mode of control (Gabrys, 2014) enabled by various digital technologies and ways of life they created. Moreover, the lockdown also turned the 'smooth space' created by the Health Code back to the 'striated space', which reminds us of Deleuze and Guattari's (1987, p. 474) remark that smooth space and striated space are constantly being translated into each other. It also shows what (Datta and Odendaal, 2019, p. 388) call 'the interspersing of routine with sporadic and concentrated acts of soft power and brute force'.

During this period, even the acquisition of supplies and necessities (particularly food and medicine) became a problem. Government supplies were usually not enough, either in quantity or in variety, to satisfy the demands of residents. At the beginning, before the lockdown took into effect, people rushed to markets and stores, and purchased and stored at home a lot of things they might or might not need.

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[139] Qiu, L 2022, 'Shanghai: starting on the 28th, a new round of Covid-19 screening will be carried out in batches with the Huangpu River as the boundary', *Xinhua Net*, 27 March, accessed 18 November 2022, <http://www.news.cn/local/2022-03/27/c_1128508376.htm>.

[140] 'Shanghai enters static management as cases keep surging; life necessity supplies and medical services for residents stressed: officials', Global Times, 31 March 2022, accessed 21 November 2022, <https://www.globaltimes.cn/page/202203/1257253.shtml>.

[141] Shanghai Municipal Health Commission 2022, *Shanghai Municipal Health Commission Website*, Shanghai Government, accessed 18 November 2022, <https://wsjkw.sh.gov.cn/xwfb/20220530/409b1f0a15b0424c910b5cb026a602b9.html>.

[142]

Then, when the lockdown came into force, they turned to online shopping platforms to scramble for necessities – not every platform could be used except several designated by the government. This was by no means an effective or fruitful way because there would be many people purchasing the same things at the same time, the number of which were limited not by the inventory but the delivery capacity. In this case, who could get the necessities they need depended on the speed of the Internet, the agility of their hands and most importantly, luck. As discussed in Section 4.1, this shows the 'glitches' (Leszczynski and Elwood, 2022) of digital, convenient ways of life, which are easy to break down when their material conditions – not only digital devices and platforms themselves but also the movement of humans, information, capital and so on, which together constitute various socio-technical machines – are affected.

One citizen in Shanghai thus wrote in her diary which was published online:

April 5 The Battle for Food

For the last week, my job is to scramble for food. The first batch of supplies distributed [by the government] can only be described as a drop in the bucket. Some friends around me have even started to eat only one meal a day.

In the place where I live, there is one app that [could be used to] shop online. To scramble for [the food] which were put on sale at 6:00 and 8:30, Mizhou and I kept watching it for three days, and read many guides in advance, but it was useless, [and we] got nothing from scrambling for food online.[143]

I turned to group buying, joining at least ten groups, breakfast group, meat group, rice group ….

As she noted, group buying became another important way for people to get necessities, which was more feasible and efficient than individual online shopping. In this specific context, group buying happened when people living in the same building or neighbourhood purchased supplies especially food directly from suppliers whom they found and contacted by themselves rather than being selected and designated by the government. There were usually one or more group leaders or organizers who were usually residents themselves and responsible for initiating group buying for specific items, recording and calculating the demand of the members, looking for and contacting with potential suppliers, distributing and sanitizing the supplies purchased, and so on.

A real story extracted from a media article could illustrate how a group for group-buying was established:

In early April, some people had already spontaneously started to find some channels for group buying. Before the Qingming Festival [April 3], we were running out of vegetables, so I searched for some grocery shopping channels on social media platforms and saw a vegetable package with a very good price. I added them on WeChat, asked about it, and found that they were a relatively large supplier. I intended to give it to a person in the residents'

[143] Tang, X 2022, 'The quarantine diary of a girl in Shanghai', 10 April, accessed 21 November 2022, < https://mp.weixin.qq.com/s/uCecH9aKb7Qn0pxFogD-vw>.

[WeChat] group who was a *Tuanzhang* [i.e., an organizer for group-buying] before, but he was too busy, so I had to do it myself.

I first asked for the supplier's information and sent it to my friend who was a *Tuanzhang*. The suppplier seemed to be very reliable. Then, because I also gave my apartment number in the residents' [WeChat] group, everyone knew that there was this person, and there might be really a shortage of supplies at that time. Compared with the loss of 50 yuan, everyone was more eager to give it a try, so the group was formed.

As shown in this story, group members used social media such as WeChat to communicate with each other, especially for the purpose of determining the demand for certain items.

The WeChat group(s) of the residents existed before, but only until the lockdown and the occurring of these group-buying activities did people get closer to each other. The protagonist in the above story further remarked:

In fact, people who live in high-rise buildings like us usually do not communicate with each other, and you have no idea who is who. When joined the residents' [WeChat] group, [we] were strange [to each other], and now people seem to have connections with each other. [We] can see these profile pictures every day, encourage each other every day, ask others if they need help, and some have even started to make appointments for meeting each other after the festival.

Although many aspects of urban life were largely limited, what I call 'media life' still flourished during the lockdown. As discussed in the last chapter, short video and other social media platforms have increasingly become not only important entertainment but also space for communicating, expressing opinions, and seeking attention and help. However, both individual and collective voices are, on the one hand, influenced by big data and recommendation mechanisms and on the hand, overwhelmed by the government narratives of pandemic control and prevention. But this does not mean different engagements with social media, which are also different ways of being-with-each-other, are not possible. In this case study, it was by connecting and grouping together on social media – as face-to-face commtaunication was not possible – that people saved themselves.

Despite the restriction on physical movement, I argue that people actualised a nomadic way of living through and with digital technologies, as according to Deleuze and Guattari (1987), as well as Braidotti (2011), the nomadic is not about movement but creating new connections and events. It was also in these connections that the Foucaultian stylization of life (Foucault et al., 1983) took place, which for me exactly means exploring different ways or possibilities of life in our being-with-others. Furthermore, it should be emphasized that by considering becoming-a-digital-nomadic as an aesthetic of existence, I do not take it as a kind of subjectivity or citizenship, but as the 'becoming-together' of human and nonhuman agents in a Deleuze-Guattarian sense (see Flint and Coogler, 2021).

There also emerged a barter economy between people living in the same building or neighbourhood. People did not only exchange food or other necessities. I noticed from social media that someone traded three oranges for half an hour's playing time with their neighbour's cat.[144] It was also noted that Coke became a kind of 'hard currency' as it could be used to trade for anything. The deals were usually made on social media and after determining the place for exchange (e.g., the building lobby), people just left the stuff there for the other to collect, without face-to-face meeting. Nonetheless, these exchange activities did not only improve people's wellbeing but also established and strengthened their connection with each other. Whether these connections would be temporary or durable, they enriched people's experience of being-with-each-other, which was significant during this hard period.

Although these activities and connections could be read as Stieglerian collective individuation or 'economy of contribution' (see Vesco, 2015), I prefer to understanding them in relation to deterritorialization and Deleuze-Guattarian 'war machine' (Deleuze and Guattari, 1987). For Deleuze and Guattari (1987), 'war' is metaphorical, and they identify the war machine with the nomad as an assemblage of intensities and singularities (Reid, 2003, Watt, 2016). It should be emphasised that a machine or an assemblage is not a mere collection of pre-determined parts but 'a becoming that brings elements together' (Wise 2011, cited in Watt, 2016, p, 300) and that these elements are not individuals but 'dividuals' as molecular components of both human and nonhuman agents (Lazzarato, 2014). In this sense, becoming-nomad is synonymous with becoming-machine. Moreover, Cohen (2011) argues that for Deleuze and Guattari, the war machine is born from 'the inevitable clash between the sweeping, unbounded movement of the nomad swarming through space, as it encounters the wall of striation' (p. 262). Despite physical movement largely limited, people did actualise unbounded movement on and through social media.

The unbounded movement was continuing: Sometimes, it might be not enough to just stick together with neighbours. For example, when a person needed a specific kind of medicine but could not get it from hospitals – it was even difficult to go to the hospitals during the lockdown, it could not be solved by group buying either, because it was unlikely that there would be many people nearby having the same demand. Thus, she had to reach more people living in every corner across or even beyond the city. One possible way for it is that they could post their difficulties and demands on social media and hope it be reposted and seen by more and more people as in a relay race. This was what many people did during the lockdown and the outbreak of the pandemic: to reach out, to get response and to return when possible. I think it illustrates to some extent what Foucault would call 'an equilibrium between self-preservation and self-loss' (Huijer, 1999, p. 74).

[144] Shashou 2022, 'Pawning during the pandemic: Who will exchange their souls for rice, and who will give me flowers?', *One way street*, 13 April, accessed 18 November 2022, https://mp.weixin.qq.com/s/hDPIe9mBwnOuaMOk-ow4aA.

Apart from these activities of self-help, there were also many people using digital technologies such as online editable forms and websites, simple yet powerful, to record, share and circulate the different needs of different people, as well as other important information relevant to the pandemic. More specifically, one might create an editable Excel form or Word document online and everyone could see it and write down their needs as well as respond to others'. With more and more information filling the blank, a public space was co-created by everyone participating in it, which was not equal to the form or Word document itself but extended into and entangled with the urban space.

For example, there was a website called 'We'll Help You · Shanghai Anti-epidemic Mutual Aid' (www.daohouer.com) on which people could post the information of help-seeking for themselves or others, and volunteers could provide help:

> As of April 15, a total of 4, 216 people has posted their help-seeking information, of which 7% have been resolved, 53% are being followed up, and 39% are pending. [145]

Although only a small fraction of the problems had been solved, this website nonetheless comforted many people by creating a space for, as well as a sense of, mutual aid and support. Moreover, for the founder of this website, it was full of the spirit of 'DAO':

> DAO is the abbreviation of 'Decentralized Autonomous Organization'. It is translated into 'island' (岛) in Chinese. It is the 'island' of 'small islands'. Do not people say that no one is an isolated island? You can also understand it in this way. It is also spontaneous co-creation, co-construction, co-governance, and sharing-with-each-other. Whenever some people issue information for help, there will be some volunteers who see and pick up the information and help the corresponding people. [146]

Rather than an example of 'decentralized autonomous organization', I take this website as a space for generating unexpected encounters and connections. This website was never designed for commercial purposes but only aimed to help people during this special period. Therefore, on May 31, 2022, when the lockdown ended, the website was also closed after finishing its mission. This further illustrate what I understand as the temporalities of encounters – but new encounters and connections could be created.

What people did in these examples was not just sharing information or helping others or themselves get the medicine they needed but more importantly, connecting and being connected with each other through the flows of data and information and developing different communities in a time when physical or spatial proximity was not available. Although these communities might be rather temporary and transient since they might disappear as soon as a specific problem was solved or the lockdown was lifted, and before the lockdown many people might not know each other even if they lived in the same building – this was common for such a metropolis like Shanghai. These activities of grouping and

[145] Xu, Q 2022, 'In Shanghai, a website, 4000 reasons for seeking help', 16 April, accessed 21 November 2022, <https://mp.weixin.qq.com/s/cU3FUEnaWRGeh3jckwUb6w>.
[146] Ibid.

connecting did not aim to develop long-lasting communities or public spheres; rather, they were improvisational, temporary and makeshift, which people came up with just to make through the difficulties. This is one of the major reasons that I do not read them from the perspective of collective individuation, as the collectivity of the 'we' disappeared even before it emerged in these encounters and connections, but they did constitute a nomadic form of resistance. And I argue that it was not so much the individuated subjects as the encounters and connections themselves that constituted the nomadic war machine against the lockdown.

As shown by the above examples, digital or information technologies, which did not need to be so complicated that they became a black box to most users, provided the possibilities for people to connect with each other. On the other hand, these connections could not be possible if there were only digital technologies but not people, for example, who shipped and delivered the supplies, be them suppliers, food deliverers, volunteers, or government staff who were permitted to travel within the city or across cities during the lockdown. For instance, in early April, there were about 11, 000 food deliverers still riding on the road, serving the population of about 25 million in Shanghai.[147] They did not only work for the food delivery platforms but also helped a lot of people personally, such as by purchasing and delivering food and medicine for those who needed them. Here is an example about how a box of medicine for treating the Alzheimer's disease was delivered to the patient:

> In the past, this box of medicine of about 200 RMB could be bought at a nearby community hospital, but in Shanghai under lockdown, to get this medicine, you had to cross the Huangpu River. [One of the deliverers described:] 'As a result, there was a kind-hearted man who placed an order in his familiar hospital. Then a deliverer in Puxi, took the order and delivered it to the volunteers. After a few twists and turns, it was delivered across the river to me. I transferred it to the neighbourhood. At the neighbourhood it could only be delivered to the entry, and I asked the security guard to help deliver it. Because I was worried that the elderly would not receive the medicine, I waited at the entry of the neighbourhood for the security guard to return before leaving.'

Through the relay of deliverers and volunteers, the patient finally got the medicine. This example illustrated the significant role of the deliverers and their movements in ensuring the supply of necessities, which was largely neglected before the lockdown although people had been increasingly relying on online shopping and food and package delivery. Here I am not simply highlighting the agency of the human, but rather suggesting that it was the flowing of data, people and supplies that together constituted the new connections among the citizens in Shanghai whether they were quarantined or on the road.

Exploring new possibilities and events, embracing unanticipated encounters, and making new connections are key to what I understand as 'becoming a digital nomad' in a digitalizing society. In a period of complete lockdown when movement was strictly limited, becoming a digital nomad certainly

[147] Linan 2022, 'In Shanghai, 11,000 people still running', 13 April, accessed 18 November 2022, <https://mp.weixin.qq.com/s/ZMd53-Y9LdRKpVfnp7tGgQ>.

did not mean travelling from place to place, but people could still meet and get closer to each other on social media and explore together for more possibilities of life. For example, in those barter activities, were not participants the nomads who initially lived in their own world but suddenly encountered each other as what Nietzsche calls 'stars momentarily in one and the same orbit'? Their encounters and connections might be temporary or more durable, but the reasons why I highlight the transience of them are: First, it is characteristic of this age of social media; second, I want to emphasize the exploring and making of new possibilities, events, encounters and connections. Although many residents living in the same buildings knew each other and were even in the same WeChat groups, they might not be familiar with each other, and it was only until the lockdown that connections were produced or reproduced between them.

Moreover, in this case study, I attempt to highlight what I consider as the original function of digital technologies and of the producing, streaming and exchanging of data, that is making connections. Not only the relations between people but also their relationship with WeChat and other digital technologies had also changed. WeChat groups were not only used to publish information but really became a space for communication and connection. This is one of the perspectives from which I understand *speaking against data*: The government did take many measures to ensure the supply of necessities, but when the voices of citizens were outweighed by the numbers of confirmed cases and the reproduction rate – this does not mean the latter was overemphasized as they literally concerned life and death (Kitchin, 2021, p. 207-8), it was through the communication and connection with each other, whether on social media such as WeChat or via online editable forms, that people went through this hard period.

On the other hand, for me, speaking also has another meaning: It is the life in its whole that speaks. I take the stylization of life in our being-with-others as a method to *speak against data* and 'becoming a digital nomad' as a slogan for it Here what is against is not only data per se but the conditioning of life by data as a mode of social control. From this perspective, in the above case, it was the alternate ways of living with digital technologies, and ways of being-with-each-other which people created through them, that provided possible space for what Foucault (1978, 1995) would call micropolitics. Here I understand micropolitics as distributed and decentralized forms of resistance which takes place through everyday events and encounters (Bissell, 2016, Richardson and Bissell, 2019), that is through ways of life. As shown in the above example, through group-buying and other activities of communicating and connecting, small yet frequent, intense struggles against the brute force of lockdown were made possible. They might be considered as a kind of 'soft politics' (Himada and Manning, 2009, p. 9), since they appeared to be more self-help than resistance, but I argue that moving across 'the wall of striation' (Cohen, 2011, p. 262) was itself a kind of protest.

This different relationship with digital technologies, as an escape or resistance, was not created by cultivating certain kind of digital subjectivity/smart citizenship or developing technological/political consciousness and digital literacy. It does not mean these are not important for a digital age, but what people did during the lockdown was exactly the same as before: using the digital technologies they were too familiar with to reflect on. But the difference was that, in Deleuze-Guattarian terminology, the human bodies entered into combination with digital technologies in a way that which allowed them to produce something new together (Smith, 2018). New events, new encounters and connections, new ways of life, and new machines. This is how I understand becoming-a-digital-nomad, as Foucaultian aesthetics of existence or stylization of life in the digital age.

But back to the discussion in the beginning of this chapter, how does this case study illustrate that we could 'appropriate the deterritorializing tools that the same technology has made possible' (Celis Bueno, 2020, p. 88) to fight against the process of dividualisation or disinvidualisation effected by it? It was in the absence of, say, the Health Code and ordinary online shopping (c.f. group buying) that those activities of connecting and grouping took place, and thus there was no 'fighting against' between them. But I argue those activities implied the possibility of new relations with digital technologies and ways of being-with-each-other, and that it is this possibility that we can follow to create 'lines of flight' (Deleuze and Guattari, 1987) to escape, although temporally, either the digital modes of the production of subjectivity and control discussed in Chapter 2 or a harsher regime of governance such as complete lockdown.

To sum up, in this chapter, through the engagement with Deleuze, Guattari, and Foucault, as well as Stiegler and Nietzsche, I take becoming-a-digital-nomad as a designation for the ways of living nomadically in the digital age, of exploring new possibilities and events, and creating new (and maybe temporary) connections under relatively fixed, durable socio-technical settings. Crucial to this methodology is reinventing the relationship between humans and digital technologies other than mutual functional determination. This relationship is one of the major themes of this thesis, and through the case study of the Shanghai lockdown, I want to suggest that a different relationship between humans and digital technologies is possible in a digitalizing society of China, despite the symphony constituted of the ubiquity of digital technologies which condition people's everyday life and the society's general indifference towards it.

Chapter VII. Conclusion: A Political Economy of Data, or Traces

Life of Numbers[148]

Filling up a whole life/ are all numbers/ who will know what the purpose is/

Bothered for a whole life/ all for numbers/ who can completely grasp/

To be known by numbers/ your IQ/ your wealth/ your body/ everything of you/

People and numbers/ there are many strange things/

Look how many hostages are imprisoned in counting machines/

In this thesis I have investigated the development of big data and smart city especially in the context of a digitalizing society of China, and how this engagement contributes to the ongoing debates within Human Geography and beyond about the relationship between humans, digital technologies, and cities in a big data era and its ontological and political implications. Specifically, in the discussion of this relationship, I focused on how big data and other digital technologies condition the ways of life, as well as ways of being-with-each-other, in cities, and how different ways of living with digital technologies are possible. To conclude the thesis, I will summarize some of the theoretical arguments and empirical concerns, and the implications of my research in relation to contemporary debates in the field and potential social or policy issues beyond academia. For the discussions in previous chapters always interlinked to each other, I will not re-present them in a strictly linear order but organize them around empirical concerns and weave the theoretical arguments, empirical concerns, and implications together.

As I have shown in this thesis, big data is not only a specific kind of datasets or digital technologies but a ubiquitous, continuous process of production, as well as generation, collection, exchange, streaming and utilization, of data, so 'gigantic' that it overwhelms every one of us and radically transforms contemporary social and cultural processes, not least in the context of smart urbanism. In Heidegger's sense of this term, the 'gigantic' refers to a situation whereby 'an ever-increasing number of entities is produced to capture a world that remains ever elusive' (Røyrvik and Almklov, 2012, p. 618). But Heidegger argues, it is not 'only the endless extended emptiness of the purely quantitative' (Heidegger, 1977b, p. 85). The gigantic force of big data makes every being quantifiable, calculatable, predictable, traceable, and thus potentially controllable and optimizable. That is to say, everything becomes data. An important conceptual conclusion to draw from this thesis is that this process of datafication is both

[148] Extracted and translated from: Lam, G 1986, *Life of Numbers*, accessed 22 November 2022, <https://www.youtube.com/watch?v=AJ2nXMhB-UQ>.

representational and ontological: On the one hand, with ubiquitous sensors and other smart devices, everything, as well as their status, movement, and behaviour, generates and is represented by data; on the other hand, every being is ontologically decomposed into dividuals – datafication qua dividuation becomes the condition of living – while individuals only fleetingly emerge in the deluge of data. This is one of the major themes throughout the thesis, but I specifically looked at it in Chapter II, when I turned to Lazzarato's work on the production of subjectivity, Deleuze and Guattari's conception of machines, and Deleuze's discussion on the societies of control.

With the proliferation of data and the development of technologies that can exploit its value, as I found from my empirical observations of the digitalizing society of China, data has indeed become a kind of wealth or production factors. However, an idea that has arisen over the course of this thesis is that data is ultimately unconsumable. Theoretically speaking, data can be preserved and used forever. Apart from property rights, which have not been well identified for data, the other issue that might hinder the repeated utilization of data is that sometimes we do not know what to do with it for the lack of ideas or tools. For example, when an open dataset has been used by a number of researchers in different research projects, it becomes difficult for others to mine more value from it. Yet this does not mean its value has been exhausted or that people cannot reuse it again and again with new research questions and statistical tools. At the same time more and more data are being produced at an ever-increasing rate. The amount and speed of the production of data is, some would argue, getting out of control. It could drive anyone crazy to just think about the question of how to consume such unconsumable, ever-growing wealth. Therefore, there occurs a paradox that to ubiquitous, continuous generation of data, we respond with ubiquitous, continuous utilization of them through various kinds of big data techniques, which work on and through the production of subjectivity, and which at the same produce more data.

Given the potential economic value of the data deluge, big data is not only applied in academic research but also in our daily lives, as well as in contexts including urban management and any other commercial and industrial activities. The influence of big data, this thesis has shown, lies more in the changes and transformations that it brings about to our daily lives than the epistemological turns that have occurred in the physical and social sciences in recent times. I have investigated two different threads along which big data affects everyday life, that is urban life and media life, in Chapter IV and V respectively, but also in Chapter II and III as I used empirical examples to clarify the philosophical discussions in these two chapters. The development and application of big data has been combined with smart urbanism, with more and more digital devices and infrastructures now embedded in urban environments. However, I observed that for many citizens in China, these changes seem to be very far away from them – as they seem to happen more on the government side – although their dispersed geographies mean that they are in fact located 'everywhere'. On the other hand, people are more sensitive to the influence of big data on our experiences of entertainment (i.e., watching videos and listening to music), online shopping, social media using, working, and so on. Big data pervades almost all aspects of our technologically-

mediated lives, especially with our increasing dependence on smart phones and various online platforms and apps. In China, it is virtually unimaginable to live without smart phones – people can and have to do a lot of things on and with them; furthermore, they plan, organize, and live their lives through these technologies and the data that they depend upon to function. Those apps we install on our phones do not only provide services; they are constantly recording and collecting data about us, whether we are using them or not. Moreover, services are provided based on these data in a so-called personalized way.

Through personalization, algorithms provide different services or information to different individuals according to their preferences or what types of persons they are assumed to be. Following the work of Lazzarato, I have conceptualised this process as a production of subjectivity. Every time the algorithm characterises a person in terms of their preference or type, it produces and assigns a subjectivity to them. Be it a food lover, a client with high financial risk or something else. Big data knows that people's preferences change constantly, and its functional goal is to capture this change in real time. That is why we have the realtimeness of big data. For each change (e.g., each behaviour, event, and problem, etc.), there is real time generating, analysing, and utilizing of data and at the same time, real time production of subjectivity. No matter whether we are what the algorithm assumes we are or not, the subjectivity assigned to us nonetheless conditions our life by, for example, affecting the choices we have or the information we are exposed to. And implied by the subjectivity assigned are actions anticipated for each individual. By limiting our possible actions, algorithms are able to influence the future production of data and subjectivity. Thus, the production of data and that of subjectivity are two endless processes which condition each other in complex ways. Investigation into such intermingling of these two processes, I argue, could provide important insights about the politics of the big data and smart city.

In Chapter II, according to Lazzarato's discussion on the two aspects of the production of subjectivity, that is social subjection and machinic enslavement, I have argued that although data cannot ultimately be consumed, subjectivity is nonetheless consumable: The individuated subject only exists for a moment; it emerges and then quickly decomposes into parts and pieces, or 'dividuals'. These 'dividuals' are then recombined together with other things and agents which are also themselves decomposed. In this thesis, I have followed Deleuze and Guattari in defining the combinations or assemblages of different things and agents on the same plane of consistency as machines. Deleuze and Guattari famously argue that everything is a machine. We live in and between all kinds of socio-technical machines as component parts of them. With ubiquitous digital devices and technologies, however, every machine is a data machine, producing data constantly and endlessly. These data are used to produce subjectivity, the process of which in turn produce more data. At the same time, the dividuals and the machines they constitute are also produced and reproduced in the production of data and subjectivity. This represents a key conceptual implication of my research, namely, that what Deleuze and Guattari refer to as the 'machinic' production of the social is today being shaped by big data in ways that far exceed what the two philosophers could ever have predicted.

I noted from my empirical observations that people often say that we are trapped in and by systems (i.e., the companies we work at or an online platform we use), when they talk about the condition of being and living in modern society.[149] A second important implication of my engagement with Deleuze and Guattari's work is that we are not located in systems but rather in machines. A machine is never a (closed) system, and we are never trapped in a machine. We become part of a machine (machines) in one moment and part of another in the next. Are not the social media platforms we use, the companies we work for, or the cities we live in machines? However, following Deleuze and Guattari, I argue that the machine does not represent a (self-)regulating force. Conceptualising an app, a company, or a city as a machine does not mean that they are self-directed, self-regulated or self-balanced as they would be in the case of a cybernetic system. Rather, a machine has neither predictable movement nor pregiven purpose. It does not go back to a pre-set goal nor an optimized result when something goes wrong. It does not regulate by restricting or encouraging certain behaviour or movement. A machine only modulates the movement, connection, and disconnection of its component parts towards no pregiven end or direction. This is how I understand a (socio-technical) machine operates. Therefore, becoming part of a machine might be not so much a bad thing as the term 'machinic enslavement' suggests. The problem happens when one is torn apart by different machines which exert forces of different (or same) directions on him or her, as shown in the empirical example of food deliverers. As long as we live in and between many different machines, this tension always exists. It was based on this concept of machines that I read Deleuzian societies of control as topological arrangements of different socio-technical machines, instead of taking them as cybernetic systems, to look for 'lines of flight' or possibilities of escape within the regime of control itself. This different understanding of the concept of societies of control is another important implication of my research.

Drawing on the work of Deleuze, Guattari and Lazzarato, I discussed what big data and smart city do and how they operate, and argued that the key issue is to understand how people's behaviour and movement produce and are conditioned by data and how both human and nonhuman agents (including but not limited to digital devices and data) constitute the component parts of different socio-techno-datalogical machines, which in turn influence the ways of life and the operation and governance of cities. I further argued that this issue ultimately concerns the relationship between humans, digital technologies, and cities. From here, I turned to the work of Stiegler and Hui, as well as some human geographers and digital media scholars, to discuss the technicity of big data in Chapter III, which concerns both the question of what constitutes big data as a technology and the relationship between this technology and humans. Chapter II and Chapter III together constituted the discussion of such relationship, but while Chapter II focused on the power relations within this relationship, Chapter III

[149] Lai, Y 2020, 'Delivery drivers, trapped in the system', 8 September, accessed 18 August 2022, in Chinese, < https://mp.weixin.qq.com/s/Mes1RqIOdp48CMw4pXTwXw>.

more the phenomenological understandings of it.

In Chapter III, by characterising big data as mnemotechnics, real-time technology, and cosmotechnology, this thesis on the one hand provided a comprehensive discussion of the technicity of big data per se and on the other, approached the relationship between humans and big data (and other digital technologies) from the three levels of 'dividual', individual, and social. At the level of the 'dividual', I drew upon Stiegler's conception of technology as tertiary retention, but while for Stiegler, tertiary retention exteriorises the social memory which are transmitted from generation to generation, I focused on how big data appropriates memory and habit as pre-personal force and thus conditions the production of subjectivity. Then, following the existing discussion in Human Geography and digital media studies, I moved to the realtimeness of big data to discuss the individual experience of living in real time, addressing the question of how the temporalities of big data conditions the temporalization of consciousness during people's everyday engagement with it. Therefore, these two discussions supplemented Chapter II's investigation into the role of big data in the production of subjectivity. Finally, turning to Hui's discussion of cosmotechnics, I discussed the relationship between people and big data in the social and cultural context of the digitalizing society of China, which I characterised as the peculiar symphony constituted of the ubiquity of digital technologies, the general indifference of the society towards them, and a sense of security and convenience brought by them, and which laid the ground for my empirical analysis of the development of big data and smart city in China in the following chapters. I emphasized this post-colonial perspective (Söderström, 2021) throughout the thesis.

In Chapter IV, I investigated empirically the smart urbanism in China, highlighting the two coexisting themes: the ubiquity of digital technologies which conditions everyday life and implies the distribution of governance in and through the urban environments; the effort to centralize urban governance through digital technologies. The significance of Deleuze and Guattari's conceptualization of machine, and thus the reason why I have sought to apply it to my analysis of big data and smart city, is that people always want to make a machine into an organism. Following Deleuze and Guattari, I have defined an organism as a centralized, hierarchized and self-directed body. It needs to keep its delicate, metabolic balance; otherwise, it will break down. Or, to put it slightly differently, it needs to keep everything at normal and to identify and get rid of any sickness or ill-being. In the development of the smart urbanism in China, we could observe many efforts and attempts to vitalize a city, to make it a living being, or a city-being as illustrated by the example of the City Brain. These efforts intend not only to utilize new information and digital technologies to assist urban managers in making decisions but also to make a city a being that can sense, think, and even act by itself. In this case, a (smart) city does not only need a brain but also features and limbs. A whole city becomes a cyborg, but this is not scientific fiction. Yet it does not mean everything is automatic and without the participation of human beings. Like technical sensors and reactors, humans are always features and limbs of a city – just as we used to be although we might not think it in this way. The development of smart cities does not imply a reduction in the investment of

human labour and intelligence in urban management, but rather a better way to appropriate and utilize it by making humans as both individuals and 'dividuals' part of the city-body. As in the case of Health Code, everyone's movement and the data they produce contribute to the control of epidemic spreading. This reading of the development of smart urbanism as the becoming-organism of cities contributed to current discussions in Human Geography and other social sciences about how smart urbanism reshapes the urban space and the governance of it. Moreover, through the empirical analysis of smart urbanism in China, I argued that the development of big data and other digital technologies effects a composite mode of digital urban governance with both the distribution of governance in and through the environments, and the centralized control of entire city flows through digital technologies.

In Chapter V, I discussed the development of short video and other social media platforms China, which increasingly relies on big data recommendation to deliver content, and their political and epistemological consequences, in particular how big data influences both the production of individual and collective voices and the ways of being-with-each-other on social media. I observed that in China, especially in big cities, many young people are tired of being a cog in large socio-economical machines, whether this is the company they work at or the political-economic system of the city. This is not only because of long hours of overtime work or high living cost but also the lack of connection and link between each other. People are connected by endless jobs and tasks as well as instant messages about them. But we seem to be losing the sense of being-connected, of being-together-with-each-other. At the same time, social media has become an important space for people to establish relationships and connections with others, not only friends and families but also strangers. But communicating with others on social media has also been becoming more and more difficult because of differences in opinions, beliefs, and values. Social media and the Internet in general are major information sources for everyone in a digital age, which now increasingly rely on big data to deliver, organize, and present content. By presenting information according to users' preferences or types, big data limits the information one can be exposed to and focuses their attention on what it assumes they would like – the data economy is also an attention economy. In so doing, it creates and presents different worlds or different realities of the world to different individuals. And this reduces the possibility and capability for one to encounter something new or different. This illustrates how big data works on and thorough the production of subjectivity. If we are really trapped in something, I argue, we are trapped in the subjectivity big data produces for us.

Especially during the pandemic, I also observed that sometimes it would be rather difficult, if not impossible, for people to communicate with each other because of the divergence of opinions. It is not that they cannot talk to each other but rather that in the face of social and political issues, there is the lack of public opinion and collective voice as a kind of social action, due to the difficulty in communication. Although the social media environment has witnessed numerous social events in which many people cared sufficiently about the same issues that their opinions caused the government to make

some changes, it also witnessed many arguments in which people with different opinions were dramatically incompatible with each other. Moreover, public opinion has been displaced by public attention to some degree – how much attention is drawn to a certain issue is more important than what kinds of opinions people hold towards it – and big data increasingly plays an important role in representing and modulating both public opinion and public attention. On the one hand, big data becomes an important way to influence individual and public opinions, for example, by presenting certain specific information to certain people and on the other hand, it is also used to calculate and analyse public opinion and attention. In this sense, I argued that data replaces collective voices to a certain extent, as it does so to individual voices. I analysed this phenomenon from Lazzarato's perspective of noonpolitics and following him, I argued that voice, either individual or collective, is essential to 'how power is enacted in the societies of control' (Krivý, 2018, p. 20).

Recall the development of the smart city such as I have introduced in Chapter 4. Everything is equipped with sensors and other digital devices so as to produce, transfer and receive data 24/7. Even humans, especially with their smart phones, have become producers and providers of data. These data include and report the information about the operation status of infrastructures, the movement of humans and objects (e.g., vehicles and goods), crucial environmental factors, and the general condition of a whole city and events happening within it. 'Let data speak' could be the best motto for smart city and the urban management practices under it. Of course, data cannot really speak by themselves; they need to be analysed and explained by humans. But we need to examine the value of individual and collective voice in urban management and for the society in general when the discourse surrounding the smart city is based on this harmful assumption that data can speak for themselves. If data can speak, do we need to speak by and for ourselves and could we do it? And will what we say become data first before it can be heard? I have argued that the value of voice could be undermined in the development of big data and smart cities unless this discourse is challenged.

In Chapter VI, on the other hand, I argued that voice does not only refer to the social or political sense of this word, such as a voice asking for attention and help or that which calls for or brings about (bottom-up) social changes, but also voice as an agency, or a power, to choose a life that one is willing to live, in the same sense as when one says 'I speak for and by myself'. Following Foucault, I argued that speaking is truth-telling, not as uncovering or self-discovering but as a kind of stylizing of life. This stylizing of life aims not to get away from a life conditioned by big data, which is almost impossible, but to make possible an unexpected encounter with something new or different. Moreover, it aims not to develop a kind of subject (or subjectivity) who is willing to and brave enough to live a stylistic life or who can match with this or that kind of lifestyle – such as an adventurer and a life full of adventures. Neither is it about determining what kind of life we would like to live and living towards it. In this digital age, stylizing is a never-ending process of life, for which drawing on the work of Deleuze and Guattari I proposed 'becoming a digital nomad' as a metaphor. It should be emphasized that this chapter

was an engagement with Foucault but ultimately with Deleuze and Guattari. Finding resources in the latter, I argued that we could 'appropriate the deterritorializing tools that the same technology has made possible' (Celis Bueno, 2020) to create different ways of living and being-with-others in a big data era, which presuppose different relationship between human, digital technologies, and cities. This is what becoming a digital nomad means. The reason why I did not directly turn to Deleuze and Guattari is that while Deleuze and Guattari's concept of the nomad enabled me to understand its powers of deterritorialisation, as my thesis shows, taking a detour through Foucault's concept of 'aesthetics of existence' or 'stylization of life' was necessary in enabling me to highlight this process of deterritorialization happens in everyday life. I further situated the discussion within the context of China through a case study of how people used digitalizing technologies to connect with each other during the Shanghai lockdown and indicated that a different relationship between humans and digital technologies, other than that in which big data simply conditions everyday life, is possible in a digitalizing society of China. Therefore, an important empirical contribution of this thesis is that it adds a different aspect to the well-known story of the rise of big data and smart urbanism in China.

Further, I argue, the other side of the stylizing of life is the problematizing of life. By problematizing, I mean that we can always question our current life experiences and ask questions such as 'Why is there no alternative?' or more specifically, 'What different life can I live?'. It requires pause, hesitation, and in-determination. Although people are not unaware of the popularization of big data, they are still largely unconscious of, or indifferent to, the extent to which big data has conditioned our lives. This is not only because of the convenience or ubiquity of digital technologies: They are so convenient or ubiquitous so that we can change nothing. Rather, this unconsciousness is fundamental to the development of modern technology and the lifestyles established in relation to it. Towards this, what we need is not only consciousness of the influences of big data but a desire to problematize our life experiences. It is a kind of habit to live our life without questioning it. But life needs wavering and hovering. This was why this thesis particularly looked at the development of digital technologies during the Covid-19 in which existing ways of life were disrupted while new ways of life create. The moment of pause is an event when a habitual action, such as in a performance, is suddenly interrupted and we do not know what to do next but there is possibility for something different to happen. The possibility of producing new encounters and events in and through digital technologies – instead of trying to escape it – is, I believe, one of the most pressing questions for human geographers interested in technology to address today. In response to the problematic relationship between humans and digital technologies in a big data era, this thesis did not suggest that certain kinds of digital subjectivity or smart citizenship should be developed. Neither did it take improving technological consciousness or digital literacy as the major solution. Rather, to advance current debates, I argued that what is needed is to create different ways of living with digital technologies.

At this point we could look back to traditional Chinese philosophy of technology. This is what I read

from Hui's understanding of it: As both Confucian and Taoist teachings – such as shown in the motto *junzi bu qi* and the story of Paoding – suggest, to live is to be free from functional determination. It means that we shall not live according to the functions, capacities or subjectivities predetermined for us. In other words, we could always do something different. This is especially important in a digital age when our lives are conditioned by big data and other digital technologies, in such a way that we feel ourselves to be increasingly determined by what our data-driven technologies present to and construct for us. In 2021, I observed that on Bilibili, another Chinese video and social media platform, people often jokingly call those 'the enemy of big data' whose likes and interests are so diverse that even big data could not know their preferences. Actually, no matter how diversified one's interests could be, big data would find a way to characterise an individual's preference. But we could explore more possibilities beyond a life conditioned by big data. On the other hand, we also need to rethink the relationships between humans, technical objects, and the world. We cannot turn back to the *Qi-Dao* relation described by more traditional forms of Chinese philosophy of technology. Rather, following the work of Yuk Hui, this thesis has shown that we need a cosmotechnology for our digital age. I believe technology should be developed and used for people to encounter different worlds, and to create possible shared worlds for both humans and nonhuman agents alike.

On March 1, 2022, the Chinese government issued the *Administrative Provisions on the Algorithmic Recommendations for Internet Information Services*.[150] It stipulates that 'algorithmic recommendation service providers should inform users in a conspicuous manner of their provision of algorithmic recommendation services' and that they should 'provide users with options that are not tailored to their personal characteristics, or provide users with a convenient option to turn off the algorithmic recommendation service'. In accordance with these regulations, many app providers such as Douyin, Wechat and Weibo have added corresponding buttons to allow users to turn off 'personalised recommendation'. But in practice, users still find it difficult to turn off algorithmic recommendation because these buttons seem to be hidden deeply and it usually takes many steps for a user to finally turn the services off. On the other hand, many users (including myself) may find that after turning off algorithmic recommendation, the media content presented to them is less interesting, and thus there is a temptation to turn it on again. Furthermore, although these algorithmic recommendation services could be turned off or finally disabled by providers, the ubiquitous, continuous production and collection of data will never stop. And they will find other more ways to 'consume' and utilize the data produced constantly and endlessly.

For the rest of this conclusion, I want to return to the question of what data is. In this thesis, I have approached data as traces. Things that once exist produce and leave a trace of some form. Strictly

[150] National Internet Information Office of China 2022, *Administrative Provisions on the Algorithmic Recommendations for Internet Information Services*, March 1, accessed 22 November 2022, <https://www.samr.gov.cn/xw/mtjj/202201/t20220104_338828.html>.

speaking, traces do not belong to anyone or anything – they belong only to time. It is the passing of time that leaves traces. In this sense, traces are the relations between the past, present and future. They do not and will not vanish. That is why we need forgetting and forgetfulness: If consciousness hangs onto traces endlessly, there is no space for new things. As Cisney (2018) puts it, 'Forgetting is not a lack or a passive deficiency, but an active, positive impulse; a *doing*' (p. 100-1, emphasis in original). However, that which big data captures and concretizes are exactly traces. It does not only collect and preserve them but also presents and re-presents the traces to us again and again to the extent that forgetting becomes almost impossible. When we see similar media content repeatedly recommended to us, for example, we do not only feel bored but also annoyed because they keep reminding us of who we no longer are. But we could let the traces go and recall them only, for example, in dreams. We need to forget and to be forgotten, I argue. However, different from contemporary debates about 'the right to be forgotten' online, by forgetting, I do not mean the removing of private information about a person from the Internet.[151] Rather, I am suggesting that we need to encounter something new or different in our life.

[151] Wikipedia 2022, *Right to be forgotten*, 29 November, accessed 10 December 2022, <https://en.wikipedia.org/wiki/Right_to_be_forgotten>.

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