The Polyopticon: a diagram for urban artificial intelligences

Stephanie Sherman[1]

Abstract

Smart city discourses often invoke the Panopticon, a disciplinary architecture designed by Jeremy Bentham and popularly theorized by Michel Foucault, as a model for understanding the social impact of AI technologies. This framing focuses attention almost exclusively on the negative ramifications of Urban AI, correlating ubiquitous surveillance, centralization, and data consolidation with AI development, and positioning technologies themselves as the driving factor shaping privacy, sociality, equity, access, and autonomy in the city. This paper describes an alternative diagram for Urban AI—the Polyopticon: a distributed, polyvalent, multi-modal network of synthetic intelligences. It posits that fourth industrial revolution technologies change the political, social, and psychodynamic relationships of sentience and witness in the city, shifting the effects of watching and watched beyond the exclusive domain of top-down surveillance and discipline. The Polyopticon poses a more expansive and ambivalent spectrum of possibilities for Urban AI scenarios, one that undermines the totalizing, singular, and cerebral notion of intelligence that so often characterizes Urban AI and smart city critiques.

Keywords Artificial Intelligence · Smart cities · Surveillance · Distributed cognition · Speculative design · Ubiquitous computing

1 Introduction

Urban objects, architectures, vehicles, and infrastructures are increasingly capable of detecting, collecting, and sharing information through a networked array of sensing and communication technologies. "Smart city" instruments like cameras, sensors, facial recognition systems, mobiles, and wearables, distributed across urban systems, provide purveyors like governments and corporations with enhanced abilities to manage, organize, and direct urban spaces, facilities, services, and subjects (Townsend 2014; Gabrys 2014). Urban AI describes the ways that city-scale and city-integrated hardware and software are embedded with capacities of real-time algorithmic decision, prediction, and response, increasingly able to adapt these models and actions based on information patterns over time (Foth et al. 2014). These capacities are not only changing existing urban interactions and dynamics, but they will likely precipitate paradigmatic shifts in urban forms, as computationally-based observation and decision, distributed and embedded throughout urban environments, reorganizes "urban zoning, architectural programming, data modeling and governance, and platform cognition" (Bratton 2021).

Academic literatures and popular commentaries regularly liken forms of digital or synthetic intelligence to the "Panopticon," a disciplinary architecture of centralized and omnipresent control conceived by utilitarian philosopher Jeremy Bentham (1791) and popularized by philosopher Michel Foucault (1975) (Koskela 2002; Costa et al. 2017; Duarte and Álvarez 2019; Sadowski 2020). Mapping this late 18th Century surveillance architecture onto twenty-first century urban models conjures dystopian destinies of corporate and/or government control, correlating the ubiquity of technologically-enabled devices with the disciplining of urban subjects. Framing the smart-city-as-Panopticon presumes consolidated machine power and reduction of human agency to be the inevitable outcome of fourth industrial revolution technologies embedded throughout urban environments. This paper contends that the Panopticon is a faulty model for understanding the sociological, technological, and psychodynamic implications of Urban AI. It posits that the continued application of the outmoded and insufficient Panopticon model and its corollary discourses limits our

✉ Stephanie Sherman
stephanie.elyse.sherman@gmail.com

1 Spatial Practices, Central Saint Martins, University of Arts London, London, UK

ability to conceptualize and steer present and future Urban AI development.

The speculative essay that follows diagrams the Polyopticon as an alternative framework for Urban AI, describing a distributed, plural model of urban artificial intelligences that do not converge through a single centralized point of power. This essay first reviews the conceptual origins of the Panopticon and its use in critiques of institutional surveillance and control. It then addresses the evolution of smart cities in relation to the Panopticon's core propositions, describing dynamics that complexify and confound the panoptic model. It finally posits the Polyopticon as an alternative framework for understanding the interaction and distribution of Urban AIs in the city.

The Polyopticon is described herein as a multiple, decentralized, polyvalent platform of platforms, an urban environment of sensing, interacting, stimulating, and simulating intelligences that aggregates into a multi-perspectival and trans-perspectival network of sensing, knowing, and sharing. If the Panopticon is an architectural formation orchestrated through socio-technical, psycho-social, and political power through the continuous production of intelligence-fictions predicated on a centralized human gaze (Foucault 1975), the Polyopticon is a decentralized, always-incomplete network of ubiquitous computation and calculation, one that incorporates the myriad perspectives of environmental objects in its matrix of observation and action. For humans within it, this distribution of sensing and sense-making produces forms of collective exhibitionism, presents new capacities for the algorithmic governance and regulation of systems and the agents within them, and enacts particular forms of power and/or incapacitation, both real and perceived. As a hybrid ecosystem of synthetic intelligences moving through, shaping, and managing urban environments, the Polyopticon generates configurations, perceptions, and integrations through means and ends fundamentally different from the Panopticon model.

The Panopticon was at first a speculative proposition, a piece of "paper architecture" which Bentham diagrammed first through prose (Ostwald 2010). Bentham spent much of his lifetime trying to secure prototypes of the apparatus with modern institutions, but these were only posthumously realized (McMullan 2015). Following Bentham's approach, the Polyopticon described herein is also a speculative model, one that seeks to expand the spectrum of possible outcomes for the integration of Urban AIs in twenty-first century cities. The description of the Polyopticon that follows reconceptualizes machine observation and decision through a posthuman paradigm of Urban AI. It views political change not as a consequence of technologies, but as embedded systems enabled by technological capacity and the vicissitudes of political ideology. Just as the affordances endogenous to these technologies shape political, social, and ecological

orientations and outcomes, the political and social systems in which technologies are created determine the ways that these technologies are developed, deployed, regulated, and distributed. Just like their predecessors of automobiles and asphalt, Urban AI technologies have the capacity to produce both profound benefits (facilitating social mobility, resource efficiency, accessibility, autonomy, and flexibility) and substantial weaponization (reinforcing human injustice, racism, repression, and violence). The Polyopticon depicts an urban landscape organized by hybrid intelligences rather than individual perspectives, one where ambivalent data, rather than a bureaucratic gaze, governs people and things.

2 The Panopticon: who guards the guards?

In the late 1700s, philosopher Jeremy Bentham wrote a series of letters and pamphlets describing a diagram of spatialized power that institutionalized the Greek concept of panoptēs—a panoptic, all-seeing vantage point. The designs were inspired by his brother Samuel, who was tasked with organizing a work compound in Krishev for the Russian Prince Potemkin. Samuel installed a small circular building at the center, enabling only a few managers to supervise a large unskilled workforce. Bentham observed the efficiency of his brother's system as a foundation for broader social organization, developing the Panopticon as a model architecture applicable in any situation where the observation and control of mass populations was necessary, including penitentiaries, schools, hospitals, and public squares. The design applied Bentham's utilitarian philosophy, which sought to serve the greatest good, through any means, to modern institutions, which demanded new techniques for managing populations and productivity as part of the very new paradigm of industrializing production (Bentham 2011; Ball et al. 2014; Crimmins 2017) (Fig. 1).

The Panopticon is a circular architecture composed of a central observation tower surrounded by a grid of cells. This spatial organization allows the inspector within the tower to see into all of the surrounding cells, and those in the cells to see the inspection tower, but those in the cells cannot see or interact with one another. A series of tubes running from the central tower to the cells enables the inspector to issue vocal messages to the watched subjects, generating a sensation of close proximity while ensuring that other subjects remain under continuous watch as direct communication between the inspectors and inspectees unfolds. The looming central tower and disconnection from others generates what Bentham described as an "apparent omnipresence." At any given time, those under watch do not know whether or not they are actually being watched, and thus presume at all moments that they are. The design achieves ubiquitous
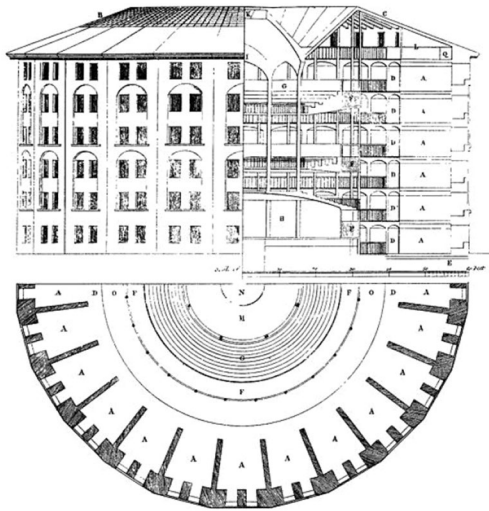
Fig. 1 Plan of Jeremy Bentham's Panopticon Prison, drawn by Willey Reveley in 1791

control via a psychic effect—the *illusion* of ceaseless surveillance (Ball et al. 2014).

This illusion not only allows the Panopticon to generate ubiquitous control over its disciplined subjects, but the architectural model also enforces control over the inspectorate. Bentham noted that the Panopticon responded to the long-held philosophical puzzle—*Quis custodiet ipsos custodes*, or, *Who guards the guards?* (Bentham 2011). By making the disciplinary apparatus visible through a conceit of continuous surveillance, the inspectorate and the inspectees alike are shaped by an interplay of power choreographed by the institutional architecture itself. What was exclusively bureaucratic power realized through interpersonal relations is now spatialized technocratic power. The inspectorate is disciplined by their obligation to perform the illusion of continuous watching, accountable to the obligatory relentlessness of their unwavering presence.

Fiction and staging play a surprisingly prominent role in Bentham's description, as the world of ceaseless observation constructed by the Panopticon's architecture is predicated as much on theatrics as it is on literal sight lines. Bentham describes in detail how the careful placement of lanterns obfuscates the shadows that might reveal the arrivals and departures of the inspectors via the tower's trapdoor. Prisoner windows are backlit, disclosing their every move through stark silhouettes. The circular architecture produces a small sliver of every cell that is not observable from the tower, but this space is equivalently conceptualized as part of the overall program, as the rhythms of appearance and disappearance trace a demand for privacy that cannot too often be satisfied without generating suspicion. Bentham insists that the inspector must actually inhabit the tower most of the time, since reality reinforces and enables the fictions

that reproduce it. Fiction is a premier delivery mechanism for producing the desired utilitarian social order, a phenomenon that both reinforces the concept of power and efficiency and provides a mechanism for its actual reinforcement.

In *Discipline and Punish*, French philosopher Michel Foucault famously described the Panopticon in broader conceptual terms than Bentham had explicitly conceived, describing the Panopticon as a metaphor for the modern disciplinary institution and its methodologies of control, namely, the internalization of institutional power by its subjects. Foucault (1995) closely followed Bentham's interest in illusions, describing how the shadow box architecture of the Panopticon staged compliant behavior through "a little theater" of individual atomization. Foucault described how the continuous perception of being watched, even if one isn't actually being watched at any particular moment, produces docile minds and bodies, which succumb to internalized orders of power in both explicit and implicit ways. For Foucault, Bentham's Panopticon was emblematic of the architectures of a modern surveillance society, one where institutional dominance produces social norms internalized and reproduced by its subjects. Both the inspectorate and inspectees become conduits of institutional power that they *automatically*, unwittingly reinforce.

> The major effect of the Panopticon: to induce in the inmate a state of conscious and permanent visibility that assures the automatic functioning of power. So to arrange things that the surveillance is permanent in its effects, even if it is discontinuous in its action; that the perfection of power should tend to render its actual exercise unnecessary; that this architectural apparatus should be a machine for creating and sustaining a power relation independent of the person who exercises it; in short, that the inmates should be caught up in a power situation of which they are themselves the bearers. (Foucault 1995)

Foucault here is clear: the modern disciplinary institution configures and orchestrates mass behavior via a structural apparatus that enables psychic control. This description is the foundation for a persuasive paranoia of modern institutions, a "surveillance society" so ubiquitous that a society beyond its disciplinary functions becomes largely unimaginable.

Deleuze's (1992) *Postscript to Societies of Control* described the impacts of surveillance on civilian liberty as synonymous with technological development. The text describes the transition from societies of sovereignty, organized around the logistics of protection, circulation, and facilitation in feudal taxation, to societies of control, defined by a logic of enclosure that routes all aspects of production through state or corporate regimes (Deleuze 2006). Long before facial recognition and geofencing, Deleuze and

Guattari (1987) and Deleuze (1992) forecasted cities organized by digital enclosures, a world of code where computational identification, rather than walls, would include or separate 'dividuals' within urban environments. The *Postscript* projects a world in which a smartcard would activate gates switched on and off by a remote controller, who could grant or prevent access ad hoc, shifting the dynamics of enclosure from bureaucratic state inspectorate to faceless remote inspector as state or corporate machine.

A society of control characterized by skepticism, paranoia, and abuse of power at a distance, was already modeled in popular dystopian science fiction long before Deleuze's diagnosis. It famously found form in George Orwell's *1984*, Aldous Huxley's *Brave New World*, and Yevgeny Zamyatin's *We*. Once the tools for remote control and communication were finally technically possible, the "electronic Panopticon" that had been so well described in fiction emerged in its image. The popular narratives of an encroaching digital infrastructure became synonymous with technological development at scale. Omniscient and ubiquitous computation was seen to enable and necessitate a state with increasingly authoritarian capabilities, threatening the liberal spirit of Western democracy by separating individuals from their humanity, which was characterized by their unique desires and the freedom to realize them (Gandy 1993). Corporate platforms, on the other hand, promised freedom from the inefficiencies of state power, ultimately binding the theoretical lineage of all-seeing state surveillance to neoliberal narratives of technological progress and independence, making ideas about individual freedom the dominant narrative of the technologies themselves. Under neoliberalism, the role of government to control via social mediation, regulation or distribution on behalf of collective need is only viewed in its dystopian and disciplinarian form.

This paranoia is prevalent today in anxieties that converge the failures of neoliberal governance with the phenomenon of monopsonistic digital capitalism in the age of digital platforms. In *Surveillance Capitalism*, Shoshana Zuboff (2019) argues that internet technologies allow for new forms of corporate dominance and manipulation built on promises of technological liberation. Zuboff blames twenty-first century digital platforms for the loss of personal privacy and autonomy, contrasting the paternalistic Fordist modern factory and its forms of physical discipline with a social media Panopticon characterized by algorithmic capacity for individualized psychological manipulation. She describes how an oligopoly of corporate media platforms collect individual user data, aggregating shared information (for sale to state and other private actors) to unwittingly nudge individuals towards choices and desires ranging from consumer items to ideological beliefs, ultimately enabling political purchase in a democratic system. Zuboff argues that, under the reign of surveillance capitalism, algorithms come to know people through their communications, emotions, movement, and behaviors. The problem with this, she says, is not only exploitation or mining of personality for profit, but also that these algorithms and quantitative measures infiltrate and reshape their unconscious. Algorithms, she says defiantly, know *people better than they know themselves*.

While this observation may be true, Zuboff's interpretation of the implications of this mode of knowing is drastically limited by her vision of the liberal subject—a subject that is free thanks to consumer capital. Algorithms might well "know" people *differently* than people know themselves, in that they observe human patterns and behaviors and impulses and vulnerabilities; they may even know them *better in some ways*. But Zuboff's critique provokes a far more existential disquiet, in that her suspicion of the subject's malleability and limited purview is also true. People may or may not know they do not and cannot know themselves completely, and this may or may not shape how susceptible they are to the contexts and constraints that inevitably shape them. Algorithmic intelligence may not always be a function of surveillance at an individual level, and knowing may be ambivalent—a path towards liberation as well as a constraint.

Zuboff's surveillance capitalism embodies the panoptic inspectorate in digital form. Under surveillance capitalism, personal preferences, data, and affiliate networks are voluntarily sacrificed in exchange for convenience, communication, and hyper-connectivity. But for Zuboff the issue is not collective information or function but market sovereignty; the ability to manipulate data about individuals compromises individual rights to fair and democratic markets. Surveillance capitalism compromises the liberal subject, for whom the right to a self, constructed via economies and identity-based self-determination, defines the highest political values. Zuboff describes unwitting subjects manipulated by corporate surveillance systems hidden in social networks. Here, Foucault's paradigm of state-as-surveillance system encounters its long history of Western democratic duplicity wherein, whether referring to Britain's legacy of camera-based policing or the United States' comprehensive Prism database, the agenda of mass surveillance is deployed to generate a docile society in service of a free market ideology. With digital platforms displaying power equivalent to state manipulation, Zuboff seeks only to preserve individual privacy and freedom *from* society as the foundation of Western capital democracy, and the only model which the disciplining gaze might reinforce or undermine.

3 Post-Panoptic paradigms

Contemporary smart cities are also often described as Panopticons, spaces where continuous observation shapes identities, behaviors, and cultures (Haggerty 2006; Galic et al.

2016; Patricio 2021; Van Zoonen 2021). These descriptions frame the introduction of fourth industrial technologies as a radical and fundamental shift from logics and dynamics of pre-computational urban infrastructural development. They focus on the ways that smart city technologies concentrate power through invasions of privacy and identity by states and corporations, how the misapplications and misappropriations of data or algorithmic knowledge can exacerbate inequality and inaccessibility, or entrench oppression and injustice, citing the repressive or chilling nature of ubiquitous surveillance. These narratives describe the ways that algorithmic prediction can enhance existing biases, and the ways that corporate ownership of digital urban infrastructure compromises public interests (Sadowski 2020; Noble 2018). These critiques often treat urban subject shaping as a new phenomenon tied to digital bureaucracy, disregarding the ways that existing urban infrastructures are also behavior-constraining and enabling technologies, from aqueducts to sewage-systems, elevators to timed streetlights, boulevards and plazas to urban media. Cities have always been sites of political contestation, violence, and domination, as well as social liberation, given that they amalgamate complex evolutionary interdependencies including coordination, consolidation, negotiation, and regulation (Mumford 1961; Bairoch 1988; Lefebvre 2011; Graham 2011). Urban Artificial Intelligences may exacerbate some existing inequities; they also may, with intention, resolve others, as logistical and infrastructural mechanisms are capable of redistributing resources in ways that override the deep human biases that undermine any algorithmic oppressions.

Smart cities in the West are almost always proposed or developed as partnerships between government and private business interests, and are also often critically framed, at least in the USA and Europe, as the encroachment of corporate capital on what was once in the domain of the state or public interest. There have of course also been examples of attempts to construct feedback-rich governance model on the state's behalf, the most famous being Stafford Beer's Cybersyn, a control center based on the premise of cybernetic feedback built to manage Chile's economy under democratically elected socialist president Salvador Allende, a vision of real-time observations limited by the computational capacity at the time (Medina 2011). Of course, in the age of neoliberalism accelerated since the late 1990s, private companies such as IBM, Cisco, Siemens, and Google Sidewalk Labs have proposed expansive partnerships with cities, seeking to incorporate high fidelity technologies and algorithmic intelligences into service provisions and infrastructure development at every municipal level (Townsend 2014; McNeill 2015). Devested of corporate support via taxes or state infrastructure, cities often lack sources of revenue for ambitious investment, or lack the wherewithal or foresight to imagine or determine a more technological future from a public

perspective. Framed as public–private experiments, updating urban infrastructure in smart cities becomes a negotiation predicated on desperation, where the gift of corporate technology to the city, posited as a fair trade, transfers unprecedented powers to companies through data collection and entrenched service provisions enabled by hardware installations and processing systems. It also grants unprecedented power to police and regulatory bodies, since there is rarely a role for ensuring public governance against such abuses.

Smart city narratives promise more efficient, responsive, innovative, democratic, safe, and resilient cities, arguing that technologies can provide a quick fix to complex urban problems of crime, poverty, congestion, pollution, etc. (Sadowski and Bendor 2018; Sassen 2013). New technologies also generate an impetus to start new cities from scratch, which all too often create slums or labor camps to enable their construction, reinforcing class distinctions that have been part of urban development since time immemorial (Greenfield 2013). In both cases, smart city narratives tend to reduce the complex negotiations and dynamic realities of most urban environments, from both the desirability of offered services and difficulties of moving past political gridlock to the nuances of daily culture and politics. Sometimes smart is smart (as when a machine learns from the success of its metaprocessing), other times smart just means statistically intelligent. IBM's smart city experiment in Rio De Janeiro, for example, was aptly dubbed The Command Center, which was short for The Integrated Center for Command and Control. The project was well known for its isolated, panoptic command center in which data was obliquely collected and managed, and likely more famous for its failure to deliver on almost all promised outcomes. The problems were multitudinous: information and mapping wielded by the analysts was inaccessible and not communicated with the public, the data and experiments were only focused in wealthy areas, adaptations of the general program to the city's specific conditions were difficult, and the data was deleted after a short time, disabling longer term thinking. Centralized command made the system quite good at prediction of concerns like avalanche detection but bad at waste management systems, especially in places where it was most needed. While the system was good at addressing preventative systematic issues, the project was notoriously inflexible, unable to respond to the immediate needs, insights, and visions of the city's users on the ground (Jaffe 2016).

Narrow technocratic solutions obfuscate the underlying social, economic and political factors that produce and sustain urban challenges of inequality and injustice (Harvey 2003). Injustices *can* get exacerbated by technologies, and this is how discourses critical of "smart" rhetoric and impossible techno-utopian promises give way to technological boogeymen. But tracing the real problem produces ambivalence towards the required organizations of power—is the

real threat mass surveillance or anarchy? Is it transparency or access? Is it bias or ownership? Or is it control or out-of-controlness? The same ambivalence applies towards claims that new outlets for civic participation or more democratic rights to the city will mitigate against the dangers of top-down infrastructural designs, without deeply engaging in the politics of how participants are informed about the complexity of the issues, and how that participation is solicited, hosted, and incorporated. Just adding people, however expertly included, to technological designs is not a prepackaged solution for addressing the risks and opportunities for infrastructural transformation. As M. Krivy aptly questions, "Is the problem that people participate in the smart city, or that they don't participate in it?" (Krivy 2016).

Urban AI technologies add an even more complex dimension to debates and analyses of the ways in which smart cities map onto panoptic or post-panoptic worlds. Artificial intelligences, with various capacities for sensing and interpretation, embedded in various systems of urban management and development, enhance the capacity of urban machines to identify, sort, categorize, and orient. Machines, whether minute or gigantic in scale, can observe and collect data, and have the computational capacity to interpret data interlinked with vast networks, "making sense" of the urban environment and making decisions and predictions based on past precedent, programming priorities and future models. AI systems develop inferences and adaptive models based on processing collected information. AI algorithms are often also black boxes, which makes the process of decision untraceable and unaccountable. Because data is based on human bias towards privileged subjects, technologies entrench and reinforce prior social hierarchies of distribution, racialization, or access. The testing of urban AI technologies disproportionately is deployed with low income and minority groups, without existing governance regulations, or checks and balances systems for overriding or refuting technological decisions (O'Neil 2016; Noble 2018; Buolamwini 1970). These fair concerns over the process of developing and implementing AI technologies lead some to conclude that Urban AI itself undermines "the right to the city," (Lefebvre 1996; Harvey 2003) inevitably giving states or corporations inordinate power over marginal populations (Tomer 2019; Calzada 2021). These critical concerns conclude that Urban AI's capacity to surveil inhabitants engaged in acts of resistance or critique, or to source information from the most vulnerable populations, can only be leveraged to exacerbate and advance a society that benefits a powerful few.

In this sense, we can start to see where panoptic power and polyoptic power diverge, as mental heuristics, technical logistics, and political control dynamics. Smart cities *can* be framed as Panopticons in that they orchestrate powers of observation to control human subjects, exercise power through space, capture and reverse visibility, embed

surveillance in architecture automatically, and connect watching techniques to objectives of power (Dreyfus et al. 1983). The key difference is that in smart cities, city users are not only subjects of a modeled environment, but, with mobile phones equipped with GPS and social media, smart devices and wearables, and personally owned autonomous vehicles and drones, they are also sensing nodes that participate in a dynamic environment of capture (Gabrys 2016). The matrix of sonic tubes that Bentham described in *The Panopticon Papers* already accounted for more remote or mediated forms of surveillance. The key difference is that in the smart city equipped with algorithmic decision-making power, this mediation does not need to pass through an all-seeing bureaucrat in a central tower. Big states and/or companies provide the hardware infrastructures, and standardize the protocols, languages, and addresses that enable interchange and interaction. However, the ways this information is sourced, networked, and governed, and the destiny and ownership of this data, is not inevitable; it is to be designed.

This ever-ubiquitous and pervasive "global surveillance assemblage" has inspired a search for terms that can account for the ways that remote control and distributed networks enabled by computational microtechnologies shape post-panoptic dynamics of discipline and power. Scholars have described how bottom-up media confers modes of agency and resistance to new forms of observation and discipline. Many describe "a reverse Panopticon" in which a multiplicity of watchers all collaborate to convene upon a singular point' (Semple 1987; Leroy 2002; Galloway 2014). From cyberspace contexts, thinkers have proposed the 'superPanopticon' (Poster 1990), the 'synopticon' (Mathiesen 1997), the 'omnicon' (Groombridge 2002), and the 'neo-Panopticon' (Mann et al. 2002). Latour's "oligopticon" points to the limitations of panoptic ubiquity, noting that 'governance has consisted of a set of partial vantage points from fixed positions with limited view sheds' (Dodge and Kitchin 2011). Media researcher Steven Mann coined the term "sousveillance" to describe how, rather than being surveilled from above by high fidelity technologies, urban users are equipped with technologies that can surveil the surveillance, counteracting or deflecting those sources of power (Mann et al. 2002). The "UbiOpticon" describes the public broadcast of mediated or surveilled observations, a screening that allows the watched to also be watchers of themselves being watched and of the others watching (Foth et al. 2014). These formulations have provided critical frameworks for overturning the dominance of the panoptic model, each differently parsing the computational gaze as a form of control, and redressing the power dynamics afforded by ubiquitous digital connectivity and communication.

Cities getting "smarter" through synthetic intelligences must not only be seen as an instrumental means of weaponization and consolidated power against human beings, but

as a capacity for urban systems and infrastructures beyond human scale. Just as infrastructures for water, waste, and pollution mitigation have undoubtedly enhanced the high level quality of life in the city overall, digital infrastructures can certainly provide for, augment, or advance otherwise unrealized services—whether or not they address collective human needs or desires. Currently, surveillance infrastructures and AI systems are not only used against vulnerable populations, but they are also deployed in support of them against bureaucratic abuses—helping to mitigate against the unchecked powers of law enforcement, stop corruption by private and public actors, and unveil obfuscations of ecological violence by corporate actors (Bullock et al. 2020; Gebru 2020). Urban AIs are especially useful for things mundane and calculative, and those that require modelling and patterning at scales far beyond that of human interaction: temperature and carbon ratings, water quality and capacity, changes in pressure and tenacity. In these cases of collective sensing, human subjects are far less important actors. In the wake of climate change, the tremendous challenges facing cities to support and capacitate a broad range of humans, and to understand and predict their impact on planetary ecosystems, cannot be addressed without further entanglements with technological equipment and forms.

In the smart city, *why* data is being procured, how and to whom it is made accessible, and under what conditions, may be more important than the fact that it is procured in the first place. Take, for example, real-time water quality measurement, navigation apps that can help drivers mitigate car accidents, or plant identification tools. These Urban AI systems can protect the broader ecosystem or support its development. For the intelligences that do focus on humans, the vast majority are concerned with people as purveyors of things or users of services rather than the reconstruction of identities in order to build consumer subjects or to discipline agents. There is of course the need and will to protect against these important human conditions, but the broader categorization of smart cities as exclusive to direct human experience, focused on climate, infrastructure, waste, and resources, leaves alien, long term, and mundane risks and requirements under-theorized.

Of course, Urban AI itself participates in posing a much broader series of epistemological and ontological questions of what intelligence actually is, and the ways in which more pedestrian definitions of intelligence, such as the ability to acquire new knowledge and information, or the collection of intelligence for political and military use, don't account as fully for the key function of intelligence, which is the capacity to apply knowledge to an environment based on *contextual appropriateness*. Whether or not decisions are actually smart or stupid can only be determined in relation to their broader context (Easterling 2021). What should make the city smart is not the technological equipment itself, it

is the ways in which that sensing and calculation capacity can carry abstractions from one situation to another. Without this, Urban AI could easily end up being the machine equivalent of "book smart," factually proficient but brittle, incapable of making abstractions from specific insights that can be transferred from one context or situation to another or generally responsive to emergent demands.

Urban artificial intelligence may then be conceived less via the framework of intelligence as the capacity for self-rendering or expression or conscious articulation, and more as a means of maneuvering, regenerating, and mutating based on pattern detection in support of higher level goals like resource acquisition, circulation, and preservation. A virus, a hurricane, or a forest already demonstrate such networked and contingent interdependencies, themselves "intelligent" in terms of their ability to channel and direct forces towards survival across a network. In this sense Urban AIs might in the end work more like a swarm intelligence, an "algorithmic unconscious" of distributed cognition (Possati 2020), or a dark forest (Konior 2020). That which is unknown and untraceable according to rational decision-making channels is the undesignated, impossible to see, automatic other, which drives the behavior, decision and volition of intelligent mechanisms.

If we conceive of Urban AI as a complex and distributed form of intelligence, one that functions more like ecological intelligence than a human brain, other opportunities appear. "Instead of considering AI in a petri dish, as some disembodied "brain," synthetic sensing and intelligence should be understood as a distributed function of the material world: a polyphonic orchestra of automation amalgamated from this uneven topography, capable of unexpected creativity and cruelty" (Bratton 2020). In this sense we might imagine Urban AI not as a singular all seeing or all-knowing machine, but as a distributed network of machine *intelligences* with various types of situated intelligences fit for purpose. If Urban AI as a term describes the phenomenon of the appearance of Urban AI in cities, then Urban AIs describe the actual dynamics of its installment, since the city is a platform of platforms under continuous recomposition. This platform of platforms is a distributed web of hardware and software, architectures and devices, machinic and synthetic sensing agents, cameras and sensors within buildings and infrastructures, mobile vehicles on the ground and in the sky, some quasi-autonomous and others wholly dependent, some supervised continuously, others intermittently, others fully automated, all of them deeply contingent on mutually interacting, reinforcing, and verifying across hierarchies and agencies. This network watches things and flows as well as humans, with policing and individual nudges a minor example of its vast potential. Intelligences work by making local or edge decisions that don't always stretch across or up to the cloud or central command. The more standards and

codes determine interoperable protocols, the less dominant one particular platform needs to be. Just as the core subject of artificial intelligences being human turns out to be shamefully narcissistic, the premise that all computation would pass through a central command center reveals itself to be, as Borges (1975) foretold, a fantasy lodged between dream and nightmare, one that likely pertains as much to a thing we are terrified of as the thing we cannot possibly have—a totalized comprehensive set of information that perfectly maps and models the world. This fear and suspicion atrophies something else, the insecurity and suspicion of data incompleteness rather than data totality.

As such, if we conceive of Urban AIs as a distributed matrix of interacting intelligences, the insufficiencies of the Panopticon as a metaphor and mental model become especially apparent. These insufficiencies not only map onto the inadequacies exposed by the aforementioned list of alternative characterizations, from the visible central tower of panoptic control to more distributed mechanisms of captivation that account for the dynamics of bottom-up power. Urban AIs in the smart city implore us to understand how the reorganizations of observational dynamics can produce an altogether different diagram of social, psychic, and political phenomena, destabilizing the very notions of discipline, surveillance, and control as consistent categories. The Panopticon is a human-centric arrangement, and human surveillance is the subject of its statistical, pervasive inspections. The introduction of ubiquitous Urban AIs implores the need for another working heuristic that can describe a configuration predicated on horizontal-vertical, centralized-decentralized intersections, a "perpendicular" diagram which, as the Panopticon did in its day, also accounts for the psychodynamic effects of a social order, this time one in which humans are no longer the core subject of machine-intelligent ecologies, and the other entanglements of the machine world in which humans are neither privy nor privileged as the core.

4 The Polyopticon

The term Polyopticon first appears in a review from Georgetown's military strategy department, which treats the Polyopticon as a digital extension of a centralized panoptic purview, with hybrid powers enabled by surveillance streams and data processing (Rice 2019). We argue instead that the Polyopticon must fundamentally reframe the Panopticon concept, given that a distributed sensing matrix generates a fundamentally different configuration of behavioral control than Foucault's disciplining apparatus. The Polyopticon describes a distributed, poly-perspectival, polyvalent, and polyphonic network of Urban AIs, a biological and synthetic ecology of hybrid agents, all sensing, intersecting, interacting, interpreting, modeling, and learning. Unlike

the Panopticon's central architecture, where the bureaucratic inspectorate watches from a singular visible institutional vantage, the Polyopticon's observation is diffused and distributed, based on multiple inputs, location information, and identifiers that do not need to pass through a centralized perspective.

In the Polyopticon, things watch things, machines watch machines, systems watch things, things watch systems, people watch things, people watch people, algorithms watch devices, and so on. Embedded across hardware, sensors, cameras, platforms, and mobiles act as agents or appendages, augmentations or accompaniments to software systems that govern its interrelations. In the Polyopticon humans and robots, buildings and infrastructures, animals and vehicles, compose a world of observations in which recognition is information. The amount of information is so extensive that it produces a surfeit so extensive that everything cannot possibly communicate or correspond with the other things in the world. Things must be codified and coded and tagged for relevance or potential relevance to become data. Things must speak or learn the language of other things (following a shared protocol) to send alerts or information in real time (Galloway 2006). Everything is partial, incomplete, and temporary.

Like in the Panopticon, in the Polyopticon the default position is one of continuous observation. Unlike the Panopticon, where the watcher clearly performs a disciplinary role, there's no explicit disclosure of why any watcher is watching or a sensor is sensing. This transforms the logic of witnessing, the dynamics of the gaze, and the stakes of being observed. At any given time, the Polyopticon may or may not be observing, may or may not be recording, may or may not be recognizing or registering, may or may not be identifying. This makes it harder to track at any given moment what is being watched by who, or who is being watched by what and what's being watched by what and what they are watching (or listening) for. The gaze comes from all directions.

As the Polyopticon displaces human subjects from the center, it makes them one amongst many actors. *If the Panopticon was a diagram of the certainty of being the subject of a centralized gaze, the Polyopticon is characterized by the uncertainty of being an object within a distributed gaze.* In the Panopticon, I do not know if I am being watched, but I presume I am, and therefore I act as if I am. In the Polyopticon I know that I am being watched, and I presume it does not matter, therefore I act as if I am not. Whether or not this is ultimately a wise survival tactic depends on the direction of the Polyopticon itself. On one hand, it can lead to increased paranoia, fear, repression, and depressive irrelevance. People feature as objects in the Polyopticon, as consumers or docile bodies, as disciplinary or liberated subjects, but they may or may not appear as subjects, per se, or as "special" or cognizant objects, depending on the needs and

functions of the AIs. As more and more things observe others and are observed by them, the characterization of "subjects" also changes. Urban AIs detect and communicate patterns otherwise unintelligible to humans, and these patterns or languages can be unintelligible to other AIs. The things that sensors observe are in large part what humans cannot observe, because of scale and scope; AIs detect microbes and biomes, register heart rates and wind speeds, map and reroute flows of traffic, waste, air, funds, and supplies, they note shifts in timing and tempo and trace this to deteriorations or malfunctions or bugs. Amidst all of this sensing, the witnessing subject no longer takes consciousness to be a special character of an object—body or bot.

The larger scale transformation of cities into ubiquitous and distributed computational sensing scapes alters human socio-psychic subjectification. People find themselves as extras in the movie rather than as leading stars of the world they set in motion. This extends the Western trends that have simultaneously generated amplified suspicion of surveillance and increasing exhibitionism and voyeurism through a hyper-mediated world (Robertson 2007; Boyd 2011). The *We Live in Public*-ification of the world, from reality TV to selfies to social media feeds to live streams has produced a vast machine that reorients the pleasures and pains of ubiquitous observation. All is surface, all is sadism, all is masochism. Everything gets turned into clickbait, a data point to be extrapolated, repurposed, and recombined.

This increased voyeurism has produced new means for deflection and hiding "in plain sight," generating techniques of ambivalence, exhibitionism, and distortion. The Polyopticon's polyvalence undermines a world that relies on being seen as means of validation. Instead, the very techniques of frequent observation generate a desire for continuous disclosure, however falsified. Rather than truth or trust, the goal is to feed the machine filtered versions of selected identities, or to finely attuned process shots where the production apparatus has been disguised from view. To be seen and not recognized, or recognized and not counted, or counted and not acknowledged produces its own psychic disturbances of hyper recognition, or lack thereof. Banksy famously reframed Andy Warhol's famous quip, "in the future everyone will be anonymous for 15 min." The Polyoptic city shifts the dynamics of "the disappearance of disappearance," from total surveillance to a dissolution of authenticity, single-personhood, and individuality.

A guard disciplines under the auspices of security, while a surfeit of information generates its own instability on two fronts. First, perceived ubiquitousness has not been, and will never be, actually completely ubiquitous. Like the Panopticon, there is always something left out of the gaze of the Polyopticon, but the incomplete picture here is more extensive and blatant than the slivers of shadows produced by the Panopticon's sphere. Secondly and equivalently, there are always truths generated by the Polyopticon that were not originally true but that have come to be true through the reciprocal mirroring of predictive and post-facto models. These truths are a function of a collective set rather than individual action, and yet they prescribe and shape individual experience as a function of a generalizable action.

Since the gaze of the Polyopticon comes from everywhere and everything at once, from sources often invisible or incomprehensible to humans, it also generates a substantial degree of fatigue, obfuscation, and irrelevance. Human subjects suffer from the depletion of being a node amongst a composed collective, a confusion that generates a diffusion of identity, a lapse in control over the Polyoptic data production. Meanwhile the Polyopticon generates myriad data points without purpose, a data surplus that must be organized to be utilized. Some sources are well hidden on purpose, others are disguised by their banality, some oblige responsibilities of disclosure (you are on camera), which can support the cause or compromise. The Polyopticon may well know who you are or where you are, but it may very well not care. And whether or not it cares is by no means a good indicator of the care it ultimately imposes on or transposes to human beings. Machines, corporations, bureaucracies, governments, animals, plants, and humans guard one another, which means that at once everything is vulnerable to a potentially suspicious gaze and everything is potentially more protected. When these actors do, in fact, mind, the problem for the Polyopticon remains one of language regulation: under what frameworks and auspices can they access the system's correlates? Ownership at an individual or collective level? A data library with its points disguised, held in the public trust?

It is in this way that the Polyopticon accelerates the ambivalences of society itself as a fundamentally disciplinary phenomenon, in that society was always its own form of artificial intelligence, only with increasingly granular fidelity and computational capacity to include perspectives of collective activity, human and otherwise. Critiques of surveillance societies are often founded on the liberal premise that, when surveilled physically or electronically, disciplined subjects are constrained and separated from a genuine, true, "original", or unalienated self that could otherwise be realized via freedom of expression and direction. Western philosophy has in large part revolved around the quest for an arrangement of governance that would enable the access and release of such liberties that result in self-actualization. In light of this broader agenda, the inherently disciplinary project of "society" or "civilization" is never actually addressed at scale, making the capacity of Urban AIs to address needs beyond immediate purview an unhappy element of the human equation.

As Freud reminded us, civilization exists because of this dissatisfaction of our most base or animalistic desires; it is an organizing tool built upon fundamental repressions of instincts on behalf of a collective order (Freud 1930). One could easily point to the organization of pre-industrial communities, where dense connections and webs of relationships were enforced through direct visual observation and identification as a means of social control (Ostrom 1990; Wellman 1999, 2001). What Jane Jacobs interpreted as 'eyes on the street,' Durkheim described as "everyone knows everyone else's business." (Robertson 2007). With the Industrial Revolution and urban growth, societal scale increased beyond the ability for little groups of neighbors to eye one another. Governments developed industrialized or mediated social control to ensure productive subjects (Mann et al. 2002). In this purview, social regulatory apparatuses are not only instruments of power, they are also extensions of complex social interests, which exist to manage complexity, ensure fair resource distribution and provide security. In this sense, the disciplinary functions of surveillance, whether via digital or physical infrastructure, has historically *enabled* cohabitation and negotiation via mediation at scale. Society as a whole is also a form of artificial intelligence, as a summation of combined wisdom with its own interpretive frameworks and pathways for decision and learning.

In the Polyopticon, the redistribution of observation beyond the tower does not inherently make the power of observation any less or more violent, or more or less capable of abuse. The question of any-opticon is about how power is accessed and wields control. Surveillance is vigilant watching, watching over. Surveillance makes those who are surveilled vulnerable to decisions by those who have the power to use the information or position obtained by surveillance to their advantage (Borradaile and Reeves 2020). Control is the power to determine how and where and when the surveillance and its corollary information are wielded, the power to act upon the information that surveillance produces, or to use the surveillance to guide further action. The long history of concerns about autonomous agents as also describing a loss of control over technologies (Winner 1977; Kelly 1995) reflects human ambivalences about governance systems and technologies as control and enforcement devices as well as instruments of power.

The smart city promises to do more than monitor, since the capacity of Urban AIs is to act upon its observations for both mundane or nefarious purposes, all determined by its programming. It may be obsequious to the demands of the whole city rather than individuals, and therefore what might appear out of control on one dimension might be more in control on another. It might need to reroute or shut down water or electricity, to act according to the holistic needs of the city or planet rather than the individual. The Autonomous Vehicle might decide to take a route more inconvenient

for the individual inside but more advantageous for the city overall. The Polyopticon is not only a means of control, it provisions control points; just as sousveillance watches the watchers, the Polyopticon models the Polyopticon, a meta-layer that governs the Polyopticon, through regulation or supervision.

When speculations *only* equate technological development with mono-lateral weaponization of human beings, or presume that human beings are always and only the subject and object of watching, and that this watching only occurs from a single central vantage, they limit the means and potential of management and governance itself. There are already many examples, in science and medicine, or in environmental monitoring, in detective work, where surveillance practices result in a positive outcome (Haggerty and Ericson 2017). When a woman disappeared in London in 2021 after a solo walk home, surveillance cameras installed on prevalent London city buses led to the arrest of her perpetrator. Surveillance is not only a means of resistance, it can be the first step towards a mechanism for governance whether by centralized or decentralized, top-down or bottom-up means. Whether of humans or systems, a network of monitoring and detection is part of the Polyopticon's function.

In the Polyopticon, privacy is not not important, it is just less of a priority as is publicness or publicity. The Polyopticon accelerates the performative and the exhibitionary. What is public comes to conceal or produce something private. This world of "ubiquitous surveillance" (Andrejevic 2012) can also be a source of liberation: As voyeurism and exhibitionism become sources of human pleasure, they produce new arrangements of counterpower (Koskela 2004). Surveillance is "a chance to display oneself under the gaze of the camera" (Ernst 2002), it generates a performance in which the identity that appears to others, either local or remote, is modified. With this voyeurism also comes suspicion (Robertson 2007). If the panoptic principle has already "turned into the pleasure principle" (Weibel 2002), then in the Polyopticon the digital individuals generated by a world of ubiquitous screens and machines form inaccurate reflections and representations of reality, which brings about another reality.

This is why the use of the Panopticon to describe social media and smart city projects led by state or private agents (or often, by both in partnership) is especially confounding because of its opaque and schizophrenic dimension. As the Cambridge Analytica scandals revealing Facebook's involvement in democratic devolution made clear, people *think* they are being watched on some dimension, but this doesn't change their behavior, because they don't know enough to override the convenience and communication conferred, or they don't care, and the political risk of being watched, at least in democratic countries, seems worth the price of public fluidity, connectivity, and convenience. In the United States the reasons are multiple, precedent trust

in benevolent state actors, in part because the social desire for self-exhibition and popular authentication overrides concern, and in part because the differential ease, convenience and pleasure that these platforms provide seem, at least in the immediate instance, a worthy tradeoff for unknown future consequences. In Europe, the GDPR ostensibly offers personal data protection, but forms of clickable acceptance and disclosure generate splash pages of trust with fine print disclosures. In mainland China, surveillance is often knowingly embraced as part of a cultural logic where individual agency is perceived as a fair tradeoff for a greater common good, as part of the regulation and advancement of the social order. Even when there is low trust in government, there is largely a cultural belief in technologies as a means for social organization and betterment (Ramone 2019). In any and all cases of the Polyopticon, the state and corporate tech use technologies for power; these same technologies can be used by those from below to capture violations, to hold accountable, and to pressurize power depending on what observations give rise to rigorous scrutiny.

The Polyopticon not only de-centers the human, it also describes an urban landscape in which humans are peripheral to the constituent agencies of machines. In this sense, the impact of the Polyopticon has more to do with machine perception, cognition, and automation, safeguarding protocols and verification, and computational mapping and modeling than the privacies or publicities of personhood or human socialization or governance. In a post-human ontology, desire is less imperative than intelligibility. Digital and physical entities are composed of packets of data and information attached to consistent or inconsistent bodies. Some correspond according to contextual maps of the entire array in which they are situated, others require only a sensibility of the immediate surroundings, others are contextless, exclusively algorithmic in form. If for the Panopticon the question of hierarchy was the obvious organizing principle, in the Polyopticon hierarchies of things perform another qualification of power and governance, largely in the capacity for inclusion or override. Sensors position, identify, measure, detect. A ping verifies recognition, the primary harbinger of translatable contact. Foreground and background meet a more robust spectrum with degrees of relevance; in network and out of network protocols can produce more private and exclusive existing walled gardens. Agents might communicate their momentum or mobility, disclose degrees of energy or power, trade data to enhance capacity, all set to sense, listen or attend to one another via priorities of interlocking securities, obligations and compatibility.

Polyoptic coordination requires cues that are structured not only according to alternative sensibilities of time but also to space, a scanning filter that spans registers and scales. As each and every object in the city becomes "smart," everything is essentially capable of sensing and communicating.

The more things communicate across platforms and devices, the more necessary it is to have either a transparent homologous protocol via which everything can reference itself, or platform systems that serve as translation mechanisms between other platforms, whether devices or data. As things model the world in order to predict it, ever deepening their topologies, they are also able to propose its transformations. What was a mute, fixed institution for discipline becomes a euphonious concert of instances, in which the architectures of control are themselves shifting in response to the changing inputs designated. If the key maneuver of the Foucauldian Panopticon was encoding power amongst the architecture of the modern institution as to "assure the automatic function of power… permanent in its effects even if discontinuous in action," the Polyopticon assures the inverse: the automatic function of power impermanent in its effects and continuous in its action. New governance models must be built to enable steerage that is protective rather than coercive or weaponized, to accentuate this capacity for expanded purview and to protect against potential violations, human, machinic, algorithmic, or urban.

5 The Polyoptic society

The Polyopticon proposes an alternative to the power diagram organized by the Panopticon. Unlike a system of centralized surveillance enacted by guards, a diffuse network of witnessing and watching reorganizes knowing and being known in the city. It exposes intelligence itself as incomplete, multiple, and diverse, appearing in patterns that can be unintelligible to humans, and with humans as one of many subjects. It produces exhibitionism, polyvalence, multiple identities, and ambivalence. In doing so, the Polyopticon repositions not only the gaze and distribution of agents, but invokes one the oldest of problems in the context of Urban AI and smarter cities—the role of governance in organizing society, and the effects of that governance on the individuals and collectives which comprise it, as a constructed and deliberate series of tradeoffs and negotiations.

There are, of course, as in the Panopticon, plenty of opportunity for abuse, instrumentalization, and violations of smart city capacities. The Polyopticon demonstrates that the outcome of this new configuration is not a fait accompli, rather, the diagram itself must be taken seriously as a political project to be orchestrated. The project must be not only to protect against the negative ramifications of AI, but also ask how humans might deploy AIs for purposes beyond themselves. This requires accepting that some degree of control will always elude frameworks with even the best intentions. Most conversations about AI start from the critical framework of protection *against* AI weaponization for vulnerable human populations. Certainly much work is necessary to

protect against deployments that will simply cascade into worst case scenarios, a world that further extends state and corporate exploitation and violence, exacerbates pre-existing bias and racism, reinforces existing inequities of capital and power, and perpetuates ecological obliteration. Of course, we must be prepared to navigate the myriad unintended outcomes of Urban AIs as they evolve cities further beyond human comprehensibility, as the system of systems further eludes us, for better and worse.

While planning against worst case scenarios is absolutely crucial, the risk also moves in the opposite direction (Beck and Ritter 1992). Urban AIs might provide a mechanism for protecting *against* long standing weaponization as much as they may be deployed as a tool for weaponization. There is an equivalent risk of not deploying technologies to protect ecologies from destructive systems, to fail to mobilize intelligence tools towards beneficial or preservational ends. Until our capacity to build systems—social, political, ecological— is at the core of conversations around AI, technological conversations will obfuscate the true ethical questions around planetary preservation, social distribution, and generative and regenerative creation.

When the Panopticon is deployed as the mental model, treating all algorithmic observation as digital surveillance, we lose sight of what artificial intelligences are and are not, and what they might be. Some aspects of privacy may willingly be compromised for new forms of publicness, others may be manipulatively reclaimed. One may sacrifice their individuality to become a collective data point. Others may frame collective intelligences as a fair tradeoff for individual constraints. Surveillance narratives that focus only on our particular loss of digital autonomy reduce us to atomized agents without any social agency other than individual will. If we follow them, cities and countries will remain competitive markets whereby state or corporate control exists exclusively to regulate human bodies rather than to enable the institutions that protect and provide for society at large.

Some of the most intensive scrutiny against Urban AIs emerges in response to the lack of accountability systems or unresolved mechanisms for contending with them. There is a much needed lack of due process for correcting the long lineage of human bias entering the polyoptic program, currently all too often without capacity for override, regulation or proper jurisprudence. These inadequacies, again, are more regularly attributed to the new functions of technological or computational intelligence rather than the social or political failures that created them, or those conditions that prevent other mechanisms from resolving them. Supervision, control, and correction are a function of the political programs enabled by Urban AIs; they are inclusive of, rather than exclusively subject to, the delivery mechanisms and technologies that enable it. They are to be determined rather than to be resisted.

Of course, as a technical assemblage, the key recognition is that the Polyopticon creates the conditions for certain kinds of political projects, and makes others more vulnerable. We do not disabuse ourselves that neither bureaucrats nor machines watch over us with loving grace. Power, that ability to influence, limit, withhold, obligate, or separate one thing from another, can certainly be accelerated by technological tools, especially those that require complex protocols to enter. It can equivalently, by those same tools, be enabled, checked, regulated and liberated, suspended or put in limbo. The cybernetic lesson, and that from the Panopticon itself, is that systems are programmed to operate in accordance with broader agendas. If the project of governance is to build a system that supports collective survival and thriving, and course corrects towards actions that support it, then the greatest challenge of steering the Polyopticon is to organize smart city governance with enough coordination to enable synchronicity without homogenization and domination. Too much centralization and you end up with an Orwellian nightmare, too little and you end up with Kafkaesque confusion.

Either way, the Polyopticon's distributed, polyvalent, polyphonic, poly-perspectival, partial network of sensing and monitoring attends to the monitoring of infrastructures and environments, shifting the value scales of autonomy and collectivity, public and private. It is a hybrid matrix of machine interpretation operating on, amongst, and amidst urban infrastructures, subjects, and agents. If we manage to program the Polyopticon properly, we might rename this exhibitionary matrix of Urban AIs, calling it a lookout rather than stakeout, cultivation rather than control, surveyance rather than surveillance, protectorate rather than inspectorate. To watch and to be watched is to be remade and remodeled in the refracted recognition of conditions and circumstances that we may explicitly embrace, and that always in part eludes us.

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