From Restricted to General Augmentation. The Networked Digital City as Augmented Environment

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Abstract

Writing in 1967, on the cusp of the era of widespread digital computation, Marshall McLuhan famously declared that all dominant media constitute an environment. How should we understand this *environmentality* in a present in which networked digital media are not only spatialised throughout cities in historically distinctive ways, but computational processes also offer novel capacities for the *production* of urban space? Drawing on current practices as well a longer history of mediated urban space, I will explore the continuities and ruptures that shape the present moment. Change in the technologies of mediation not only alter how cities look, but recalibrate processes of perception, inhabitation and social encounter.

Keywords: Media Environment; Media City; Light; Immersion.

Abstract

Nel 1967, alla vigilia dell'era della computazione digitale diffusa, Marshall McLuhan affermò che tutti i media dominanti costituiscono un ambiente. Ma come interpretare questa idea oggi, in un contesto in cui i media digitali in rete non solo plasmano le città in modi storicamente nuovi, ma i processi computazionali aprono anche possibilità inedite per la produzione dello spazio urbano? Partendo dalle pratiche contemporanee e da una lunga storia dello spazio urbano mediato, questo articolo indaga le continuità e le trasformazioni che definiscono il nostro presente. Le evoluzioni nelle tecnologie di mediazione non solo influenzano l'aspetto delle città, ma ridefiniscono i processi di percezione, abitazione e interazione sociale.

Parole chiave: Ambiente Mediale; Città Mediale; Luce; Immersione.

Designed by Cass Gilbert and completed in 1913, the Woolworth building in New York was the world's tallest structure until the completion of the Chrysler building in 1930. It was also one of the first buildings to be explicitly designed with electric illumination in mind. The building exterior boasted specially designed terracotta tiles to act as surface reflectors and incorporated external lighting that increased in intensity with height, while its tower was crowned by a constantly rotating lamp.

Significantly, the building's grand opening took place at night. President Woodrow Wilson – who was in Washington – pushed a button to switch on the 80000 interior lights, instantly and dramatically showcasing the thousands of windows that were a key feature of what came to be dubbed the "cathedral of commerce". Wilson baptizes the building – not with water, but with light.



Figure 1. The Woolworth Building at night, New York, between 1910-1920. (US Library of Congress Detroit Publishing Company collection, public domain. LC-DIG-det-4a24623)

I want to use this example to reflect on the new urban environment that was being established at this time. My focus is less the vertical structure of the skyscraper that became the key architectural symbol of the modern city than the new urban atmosphere that electric lighting generated. Light has often been associated with rationality. In English, expressions such as "I see the light" or the cartoon image of the light bulb as a vernacular sign of comprehension connect to the deeper history encapsulated by the term "Enlightenment." But one of the most striking features of the electrical illumination of the modern city has been the way it constantly exceeded any rational agenda. Instead, human experience of the electric city is marked by perceptual overload, which became a common theme for numerous writers and artists in the 1910s and 1920s. One classic formulation comes from the novel *Metropolis* written in 1925 by Thea von Harbou.¹

The workman No. 11811, the man who lived in a prison-like house, under the underground railway of Metropolis, who knew no other way than that from the hole in which he slept to the machine and from the machine back to the hole – this man saw, for the first time in his life, the wonder of the world, which was Metropolis: the city, by night shining under millions and millions of lights. He saw the ocean of light which filled the endless trails of streets with a silver, flashing luster. He saw the will-o'-the-wisp sparkle of the electric advertisements, lavishing themselves inexhaustibly in an ecstasy of brightness. He saw towers projecting, built up of blocks of light, feeling himself seized, over-powered to a state of complete impotence by this intoxication of light, feeling this sparkling ocean with its hundreds and thousands of spraying waves, to reach out for him, to take the breath from his mouth, to pierce him, suffocate him [...] (von Harbou n.d., 50-51).

von Harbou's prose here is florid and emotive. But you can find many similar pronouncements about the *excessive* impact of electric lighting from a virtual who's who of the modernist *avant-garde*, including Futurists such as Marinetti and Boccioni, Soviet luminaries such as Majyakovsky and Eisenstein and poets such as Ezra Pound. When Maxim Gorky visited Luna Park at New York's Coney Island in 1913 he was so moved that he proclaimed:

Thousands of ruddy sparks glimmer in the darkness, limning in fine, sensitive outline on the black background of the sky shapely towers of miraculous castles, palaces and temples. [...] Fabulous beyond conceiving, ineffably beautiful, is this fiery scintillation (Quoted in Koolhaas 1994, 29).

¹ von Harbou was Fritz Lang's creative partner on nine films produced between 1924 and 1933. As a married couple, they formed a pioneering multimedia duo, with von Harbou writing scripts and publishing novels in multiple languages, while Lang directed the films. Von Harbou also wrote scripts for other major German directors including Carl Dreyer, E.A Dupoint and F.W Murnau.

Another striking example comes from Lewis Mumford, the great urbanist and theorist of technology. In his autobiography, Mumford, who was born in New York, describes his most memorable experience – one that stands out from all others even toward the end of his long life – as witnessing the transition from daylight to dusk while walking across Brooklyn Bridge:

The towers, topped by the golden pinnacles of the new Woolworth building, still caught the light even as it began to ebb away. Three-quarters of the way across the bridge, I saw the skyscrapers in the deepening darkness become slowly honeycombed with lights, until, before I reached the Manhattan end, these buildings piled up in a dazzling mass against the indigo sky. Here was my city, immense, overpowering, flooded with energy and light [...] (Mumford 1982, 129-130).

The same Broadway on which the Woolworth building was located was already becoming known as the "Great White Way" due to the intensity of its electric illumination. Writing to a friend in 1923, literary theorist Kenneth Burke noted how the Great White Way exceeded the sum of its parts: "Broadway is qualitatively rich; not a single light on it is worth a damn, but the aggregate of so many million lights demands attention" (quoted in Jay 1990, 131). Historian David Nye (1997, 88) argues that it was this electric cityscape that provided the *cultural* ground of modernism. Which is to say, the experience of being immersed in the atmospheric light of the electric city inspires a new cultural imaginary: one that is incontrovertibly a *techno-cultural* imaginary.

1. Light as Media

A few decades after electric lighting had become an urban commonplace, Canadian professor of English literature Marshall McLuhan started to advance his theory of media. Initially, he drew heavily on the work of economic historian Harold Innis (1950, 1951). Both Innis and McLuhan were interested in how different forms of mediated communication shaped the emergence of different social forms. Where Innis principally focused on the transition from oral communication to different modes of writing, McLuhan's main innovation was to bring the new electric media of the 20th century – especially television – into this framework. And where Innis emphasized the economic and territorial impacts of media, such as the role of paper-based writing in enabling the administration of more extensive empires, McLuhan paid a lot more attention to the transformation of human sensory perception. In his best-known text, *Understanding Media* that was published in 1964, McLuhan takes electric light as an exemplar, declaring it to be a "pure" medium:

Whether the light is being used for brain-surgery or night baseball is a matter of indifference. It could be argued that these activities are in some way the "content"

of electric light, since they could not exist without the electric light. This fact merely underlines the point that the "medium is the message," because it is the medium that shapes and controls the scale and form of human association and action (McLuhan 1964, 16-17).

Electric light is used by McLuhan to advance his main argument that changes in media correspond with changes in both individual perception and collective social life inasmuch as changes in media alter the "scale, pace and pattern" of social interaction.² Hence his provocation aimed at contemporary critics such as Federal Communication Commission chair Newton N. Minnow who famously lamented the "vast wasteland" of television3: for McLuhan, what was most important about television was not what was on the screen, but the fact that the screen was on, allowing millions of spatially dispersed viewers to be linked in a new experience of simultaneous witnessing. However, this transformation often drifts out of focus, precisely because we pay more attention to the message than to the effects of the medium. In 1967, McLuhan wrote an important essay for the Yale Architecture School journal Perspecta, in which he sharpened this argument. After restating his contention that all dominant media constitute a distinct perceptual environment, he argued that a dominant medium becomes taken for granted and therefore hard to perceive. Its environmental effects become invisible (McLuhan 1967). By the 1960s, the electrified city had arguably become this kind of "invisible environment." While people certainly saw electric lighting nearly everywhere they looked, they gave little or no consideration to its environmental - or mediatic - effects. Along one axis, these effects included the incubation of new patterns of sociality, as the working day was no longer so closely tied to the availability of daylight, while a leisure-based "night life" had gained new prominence. But electric lighting also altered perception of the city in a far more direct way. Andy Warhol seemed to understand this intuitively. In the context of discussing his Empire State Building (1965) film, he observes: "If you build buildings with lights outside, you can make them indefinite, and then when you're through with using them you shut the lights off and they disappear" (Quoted in Angel 1994, 15).

2. The Media City as (Invisible) Environment

Warhol's observation situates the electric city – the electropolis as it was often called at the time – as a new kind of mediated urban environment.

^{2 &}quot;For the 'message' of any medium or technology is the change of scale or pace or pattern that it introduces into human affairs" (McLuhan 1964, 16).

³ Minow used the "vast wasteland" phrase in his speech "Television and the Public Interest" given to the National Association of Broadcasters on May 9, 1961 https://en.wikipedia.org/ wiki/National_Association_of_Broadcasters.

Electrification of lighting meant that urban appearances became dynamic in a new way, effectively rendering the city editable. These fundamental changes to the city's visual appearances worked in concert with the way that the embedding of modern media such as telephones and radio were progressively redefining the experience of urban inhabitation. To appreciate this historic shift, which constitutes the threshold of the "media city," (McQuire 2008) we need to break with the habit of understanding the relation between media and the city from within a traditional paradigm of representation. According to this paradigm, studying the media-city nexus is a matter of tracing how the city has been represented in a specific medium, whether this is literature, painting, photography, cinema or something more contemporary such as computer games. The underlying assumption is that the city is a pre-existing entity already awaiting its re-presentation as an image. My framing argument in The Media City is that, from the late 19th century, the embedding of various forms of electric media into material urban settings makes it more evident that the city can no longer be defined in advance of its "mediation".4 Over time, these new media progressively redefine not only how cities look but also how they function as social spaces. The transition to the new environment of the media city creates what I have termed the modern *media-architecture complex*, designating a condition in which urban spatial experience comes to be *co-constituted* by the interlacing of material structures, embodied interactions and technological media.

Staying with McLuhan's example of electric light, we can note that the oneiric night city that emerges as such a distinctive facet of 20th century urban experience is emblematic of this new entanglement of media, bodies and urban space. Edison's initial public experiments with street lighting displays in 1879 attracted milling crowds to his Menlo Park establishment. Similarly, the excessive lighting schemas deployed from Woolworth's shining "cathedral" to the Great White Way were not simply something to be looked at from afar – although they undoubtedly featured in so many images – but provided an environment for collective immersion. As David Nye remarked:

For the millions of tourists who came to stare at them in Times Square, the signs only incidentally advertised an array of products. They came to see the sheer size and magnificence of the flashing signs; they were engulfed in a restless crowd, and the roar of the city (Nye 1997, 88).

We can further grasp how different the *electric* city was from all earlier forms of urban illumination through the example of "the Zipper," a linear text display erected in New York's Times Square in1928. The Zipper consisted of 14800 light bulbs that could be programmed to display shifting letters. It was conceived

⁴ This is not to suggest that the city was ever *without* media, but is intended to draw attention to the fact that modern media provide fundamentally different affordances.

by Frank C. Reilly, who also designed many of New York's most famous electric advertising signs, and broadcast news headlines into Times Square for more than five decades (Cressman 2018).



Figure 2. "The Zipper." Crowds in Times Square read headlines concerning the D-day invasion, June 6, 1944. US Library of Congress, Office of War Information collection. Public domain. LC-DIG-fsa-8d36243

A reporter who visited Reilly's office in the 1930s described a three-panel cartoon on his wall. The first panel showed three men starting to cross the street when their attention was distracted by the Zipper. In the second frame, the men are hit by a taxi and sent flying into the air. In the third frame, they land and see the headline has changed to "3 hit by taxi in Times Square" (see Nye 1994, 191). This cartoon encapsulates the way that electric media, including dynamic signage such as the Zipper, start to generate novel feedback circuits in which an "event" and its representation can be linked in a new way, according to a (more or less) "realtime" temporality. While the cartoon is clearly poking fun at this condition, today these trajectories are much further developed. Static billboards have been converted into dynamic screens, while LED screens have been scaled to building-size skins, creating what Paul Virilio called "media buildings": structures that exist less for the purpose of inhabitation than display. The growth of networked capacity, coupled to exponential decreases in the cost of sensors and computing means that the feedback loops that can between established between media, urban structures and urban inhabitants are no longer a matter for ironic humour. Rather, these new modes of action and interaction, from communication to urban navigation to large-scale data capture, have become the weft and warp of the everyday urban environment, dynamically defined by billions of interconnected devices. As the late Bill Mitchell from MIT's Media Lab remarked more than two decades ago:

In cities today, electronically propagated narratives flow constantly and increasingly densely. These narratives – superimposed, as they are, on real space in real time – act as feedback loops recursively transforming the very situations that produce them. (Mitchell 2003, 107)

Media feedback has now become a key attribute of a new urban imaginary, conditioning how we think about the city and how we learn to act within it. If we take McLuhan's provocation seriously, this setting constitutes our new "invisible environment." We know it's there, but do we really understand it as an *environment* – which is to say, as *media*?

3. A Brief Archaeology of Immersive Media

Before I try to address this question, I want to make a slight detour. Current discourse about "immersive media" tends to focus on (relatively) new forms such as Virtual Reality (VR) headsets. As I began to draft this piece in mid-2023, Apple announced their new Vision Pro, accompanied by another round of news stories asking if this would be the year in which VR would – finally – "go mainstream."

As a media theorist, I find it instructive to compare these recurring popular narratives extolling the inexorable "progress" of new devices to a longer lineage of immersive media. Almost 20 years ago I was part of research project led by Dennis Del Favero, Jeffrey Shaw and others at the iCinema Research Centre that developed a prototype 360-degree digital camera.⁵ This research was part of a larger suite of projects that eventually led to the development of the AVIE, a 3-D immersive and interactive visualisation system which has since hosted many different projects, from art works and interactive narratives to heritage and industrial training models.⁶ The AVIE is representative of a new wave of audio-visual displays which took advantage of the flexibility of digital imaging to create innovative immersive environments that had new potential to be dynamic and responsive to users.

⁵ See http://www.icinema.unsw.edu.au/projects/spherecam/overview/

⁶ See http://www.icinema.unsw.edu.au/projects/avie/project-overview/ AVIE Project Directors: Jeffrey Shaw, Dennis Del Favero. Programmers: Ardrian Hardjorno, Volker Kuchelmeister, Matthew McGinity. (Additional Software and Hardware Engineering: Jared Berghold, Marc Chee, Robin Chow, Alex Kuptsov, Alex Ong & Xin Guan). Project Funding 2004-2020: ARC DP0209550, ARC DP0345547, ARC LE0453517.



Figure 3. Dennis Del Favero. *iFIRE*. 2023. (inside iCinema AVIE theatre). Image provided by the artist.

It is easy to fit the AVIE into a longer archaeology of immersive imaging that includes signal moments such as the Disney corporation's experiments with 360° cinema in the 1950s and 1960s, from 1955's Circarama using eleven 16mm projectors to Circle-Vision 360° a decade later using nine 35mm cameras. Or to the history of dioramas and panoramas that were a distinctive feature of popular urban entertainment culture in the 19th century (Huhtamo 2013). And, as Andrea Pinotti (2020) and others have argued, this lineage could include events such as the invention of geometric perspective, because it is clear that contemporary viewers experienced many of the same qualities, such as blurring of the protocols for distinguishing between 'image' and 'reality', that we tend to associate with immersive imagery in the present (see also Kittler 2010, 49-60).

In the 21st century, we don't usually think of painting or even cinema as particularly "immersive." This is partly because we can now judge their offerings against new forms such as 360-degree digital projection systems. But it may also be because our perceptual habitus has changed. Let me explore this idea briefly. Back in 1998, IMAX had been recently been privatized, after decades of life-support from the Canadian taxpayer. I was contracted by the Australian Film Commission to study large-format cinema and consider whether the giant (70mm/15 perforation) film format could become more mainstream. In fact, this didn't happen. The main reason was economic, which I won't go into here.⁷ But a second issue, relating to visual perception, is very relevant. One of the best interviews I did for the project was with Australian filmmaker John Weiley. He had directed one of the most commercially successful large-format films – the documentary *Antarctica* (1991) – and later helped to establish the IMAX cinema in Sydney's Darling Harbour. He also made a short (22 minute) 3D large-format film called *Imagine* (1993), which was partly inspired by the development of MRI technology. As Weiley describes it:

Imagine is just an entertainment, it's not a serious movie, but what really inspired it was working with doctors at Boston who had just developed the first real time 3D magnetic resonance imagining. So we could have a 3D brain in front of our eyes experiencing stimuli and see the brain reacting in real time. It was fascinating and it taught me some basic things about the [large-format] medium. Because one of the things we discovered was that showing people movies on a television screen and showing them a television screen or print on paper activated the same regions of the brain in comprehension. But as soon as we put on our VR goggles, so that they have no frame of reference, the old areas of the brain, the sort of old reptilian brain was all brought into action – you know, the things that govern digestion and breathing and balance. They're all brought into play, they all became part of the experience, which is highly relevant if you're working in the giant screen, frameless medium (Interview with the author, 1998).

What's interesting here is the way that MRI allowed Weiley to literally see the relation between large-format film and VR headsets insofar as both aim at a condition of "framelessness" (Pinotti 2020). One uses a giant screen to saturate the visual cortex, while the other achieves the same effect by situating smaller screens much closer to the eye. Weiley went on to argue that conventional film style doesn't transfer well to the large-format medium because it is perceived more by the "old reptilian brain" and thus generates a different relation to the image. Using the short, sharp cuts that are the normal film language of contemporary cinema can disorient viewers and even make people feel sick. For this reason, large-format is better suited to long, slow tracking shots.

The deeper point I want to make via this detour into immersive media is that what one society or era experiences as "immersive" may well appear thin and unpersuasive to another. In other words, the experience of "immersivity" is neither fixed, nor simply a technical issue defined by factors such as screen size, image resolution or frame rate. Any experience of "immersive media" is about the relation established between a specific media interface and the spectrum of

⁷ See the report, *Maximum Vision: large-format and special venue cinema*, Sydney and Brisbane. Australian Film Commission and Australian Key Centre for Cultural and Media Policy, 1999.

situated and contingent perceptual experiences that collectively shape the human sensorium. It is instructive in this regard to recall Walter Benjamin's comments after visiting the Soviet Union in 1927. Benjamin (1999, 14) remarked on what he called the extraordinary perceptual experiment being conducted as illiterate Russian peasants were exposed to motion pictures for the first time.⁸ Benjamin's point was that, unlike city dwellers, the Soviet peasantry had little or no exposure to the new machinic-electric urban environments that themselves generated perceptual impacts akin to what he called the "shock effect" of film. Lacking this acculturation, peasant responses to the impact of montage could well be heightened – even to the point of those first crowds reported to flee in the face of the oncoming train at the Lumiere's pioneering public screening.

While accounts of the credulity of early cinema audiences have been shown to be largely apocryphal, Benjamin's example encourages us to think about how human perceptual habits – and also social and political *habitus* – can change over time in concert with new technology. Changes in film language offer one small but significant example. The average shot length of commercial feature films is now less around four seconds and many films contain several thousand edits. This compares to twelve second average shot length in the 1950s and the one tenth of the number of cuts that mainstream films had in the 1930s (Cutting & Candan 2015). The bravura editing in the famous Odessa steps sequence of Sergei Eisenstein's *Battleship Potemkin* – which Benjamin clearly had in mind when he wrote about cinema's capacity to explore the urban environment with "the dynamite of its fraction of a second" (Benjamin 1999, 27) – has become the new normal.⁹ Which is to say, taken for granted and receding towards invisibility as media.

⁸ Benjamin wrote: "To expose such audiences to film and radio constitutes one of the most grandiose mass-psychological experiments ever undertaken in the gigantic laboratory that Russia has become" (1999, 14). This "experiment" would later include novel projects such as Alexander Medvedkin's cine-train (adapted from the civil war agit-trains) in which film crews took specially equipped trains into remote rural communities (see Crofts & Enzensberger 1978). Film would be shot during the day, developed in labs on the train and then screened to the community at night. This allowed people who had never previously seen film to be suddenly exposed to images that included their everyday environment and even themselves. The aim was to use the experience of seeing one's own community represented on film to generate feelings of collective goodwill and national fervour.

⁹ Benjamin first uses this phrase in his 1927 reply to playwright Oscar Schmidt's dismissive review of *Battleship Potemkin*. A similar formulation celebrating the "dynamite of the split second" makes it into the second version of his famous "Artwork" essay (Benjamin 2002, 117) and persists into the better known third version (Benjamin 2003, 265).

4. Immersed in the digitally augmented city

This is a good point to return to the contemporary city, understood as an environment that is being profoundly remade by networked digital infrastructure. One thing we can productively pick up from Benjamin's argument about the film-city relation in the 1920s is that modern perceptual norms have increasingly been conditioned through their structural coupling with the city as a distinctive material-symbolic environment. If we transfer this insight to the social and perceptual experience of the contemporary city, with its vast assemblage of networked sensors including cameras and microphones, its multitude of large and small screens, and its connective networks enabling all kinds of devices to be linked to various databases as well as to each other, it is clear that this city has been newly "augmented" in many respects. But if we assert that the contemporary networked city has *itself* become a form of "augmented reality," what are we actually saying?

Let me begin by making a provisional distinction between what might be called "restricted" and "expanded" AR. I would use the former to describe specific examples of augmentation such as individual apps or projects. In contrast, expanded AR would be about acknowledging the way that media feedback has become *environmental* in the contemporary city. I'd hesitate to claim that networked digital urbanism is our new "nature," as McLuhan once provocatively asserted about electric media.¹⁰ Rather, networked digital infrastructure, with its distinctive sociotechnical architecture and spatio-temporal patterning of communication (or 'feedback') has become part of the *ground* of the contemporary city. But this is a strange ground: it's what the sociologist Scott Lash (1999) once called 'groundless ground', referring to a ground that possesses neither fixed properties nor essential qualities but is inherently *relational*.

Groundless ground is part of the condition I have previously described as *geomedia* (McQuire 2016).¹¹ In my reckoning, geomedia is not simply a reference to the growing importance of so-called locative media but is about the instrumentation of the "geo" – the earth, the ground – at planetary scale. In terms of urban experience, this means that the social functions of urban structures and sites not only become more flexible, but that the affective experiences and meanings they support are increasingly defined by the capacities of networked digital media working in concert with material-symbolic properties of the built environment. The emergence of geomedia over the last two decades has enabled a new spatialization of media *mithin* cities, as well as a greater integration of media into place relations. The distinction I am making between restricted and general augmentation is intended to be strategic and heuristic. It should not

¹⁰ In *Counterblast*, McLuhan (1970, 14) asserted that "new media" "are not bridges between man and nature: they are nature".

¹¹ I argue that media become "geomedia" along three trajectories – ubiquity, positonality and realtime feedback – which become increasingly dominant in the 21st century.

be hardened into an opposition since "general" or environmental augmentation is itself a function of the concentration and overlay of multiple specific augmentations within the contemporary city. These include projects for displaying spatialised information using the mobile phone screen, which is arguably the most common understanding of AR in the present. Early examples included the Museum of London's award-winning 2010 Streetmuseum app that enabled historical photographs to be seen at the site at which they had originally been captured. By carefully negotiating the position of their hand/phone-screen, users could produce a live "remix" of past and present as a screen image. In the same year Manifest.AR developed an app allowing digital artworks to be seen "inside" New York's Museum of Modern Art without curatorial invitation or permission. More recent examples have included a string of projects such as the *AR.TRAIL* exhibition held in Melbourne in 2022 which use phone screens to display artworks both inside and outside art galleries.¹²



Figure 4. Photograph showing the digital artwork *Shoeform* (sprouting) by Patricia Piccinini on site at Melbourne's Federation Square as part of the AR.TRAIL exhibition (August 22 to October 1, 2022) developed by the National Gallery of Victoria, Australian Centre for the Moving Image and Federation Square in conjunction with London-based Acute Art. (Photograph by the author)

¹² See https://www.ngv.vic.gov.au/exhibition/ar-trail/

While these projects are often understood from the point of view of curatorial strategies for audience "engagement," they also demonstrate how spatialised information functions to alter and contest place relations. Changing the site at which you can access information changes its value and impact. This may relate to what is allowed inside a bounded and carefully curated space such as an art gallery. Or it may contribute to how a site is understood or remembered. Using spatially-curated information offers an as-yet largely untapped potential for addressing the legacy of colonialism and the wholesale overwriting of place memory by colonisers. A small but significant example is the guided walk app Billibellary's Walk, which provides a First Nation's perspective about the grounds and buildings of the University of Melbourne where I work.¹³ Billibellary, who was born in 1799, was the *Ngurungaeta*, or clan head, of the Wurundjeri people who are the traditional owners of the land on which the University of Melbourne was established. The app provides a distinctive way of reflecting on a history marked by both violent dispossession, resistance and survival.



Figure 5. Screenshot from Stop 4 of the Billibellary's Walk app, Baldwin Spencer Building, University of Melbourne.

¹³ See https://billibellaryswalk.stqry.app/



Figure 6. Screenshot from Stop 5 of the Billibellary's Walk app, Murrup Barak, University of Melbourne¹⁴

While AR apps using the small mobile screen inevitably tend to focus on individual experience, contemporary cities have also been progressively remediated by forms of "augmentation" that are capable of producing *collective* impact. The entire field of urban lighting has been radically transformed over the last two decades: first by the introduction of LED solid-state forms (which have also transformed screen displays), and second by the integration of lighting with computational control. As Bill Mitchell remarked a decade and half ago:

¹⁴ Billibellary's Walk was developed by a research team comprising of Onemda VicHealth Koori Health Unit and Murrup Barak with input from a reference group which included Ms Shawana Andrews, Ms Ngarra Murray, Mr Craig Torrens and Mr Warwick Padgham. The support of the following individuals and groups was critical: Wurundjeri Tribe Land and Compensation Cultural Heritage Council Inc – staff and members; Aunty Margaret Gardiner – Wurundjeri Elder; Aunty Joy Murphy-Wandin – Wurundjeri Elder; Office of the Provost, The University of Melbourne – Learning and Teaching Initiative Grant. More information: https://murrupbarak.unimelb.edu.au/home/about/billibellarys-walk

"the traditional distinctions between architectural lighting design and computer graphics are beginning to disappear. Anything that lights up can be treated as an addressable, programmable pixel" (Mitchell 2005, 88-9).

As a result of these changes, LED skins on buildings can be made responsive to diverse real-time informational inputs such as local weather conditions, or programmed to perform time-based patterns. Projection mapping techniques now enable images to be form-fitted onto buildings and other structures, enabling precise alignment of light-effects in relation to the surfaces, forms and volumes of physical structures. This range of new possibilities means that projection and light art has recently been widely adopted as a form of urban augmentation (Jackson 2015; McQuire 2022). Programmable urban illumination has become a tourist attraction and arguably - in the case of the nightly "Symphony of Lights" performance that has now run nightly for almost 20 years utilising the buildings of the Hong Kong skyline as a collective canvas - a form of state propaganda.¹⁵ Moreover, lighting is no longer limited to urban surfaces. Fleets of drones can now used to construct elaborate mobile 3D light sculptures, in which each individual drone becomes an addressable and controllable light pixel functioning as part in a collective arrangement.¹⁶ The growth of these projects, both in terms of their number and their scale, suggests they have fast become an integral part of the modern urban spectacle.

In this context, it is salutary to recall an*other* history of urban projection that specifically aims at using "augmentation" not as ornament but as a way of contesting the social and political relations of architecture and public space. Public space is what philosopher Hannah Arendt (1958) famously characterised as the "space of appearance." It is the site on which the fundamentally *political* acts of speaking and acting take place. Public space is both the "support" for such acts but its very "publicness" is also in part constituted by these acts. This dual role has been critical to the work of Krzysztof Wodiczko, who was one of the pioneers of urban projection in the 1970s and 1980s when first he became well known for his large slide-based images projected onto significant public buildings such as the Hirshhorn Museum. Wodiczko also undertook occasional, more tactical interventions such as his projection of the swastika onto the pediment of the South African embassy in London's Trafalgar Square at the height of the anti-apartheid movement in 1985.

For Wodiczko, projection offers a unique and direct way of contesting place relations – and doing this in public. Overlaying architecture with carefully calibrated symbols used the building as a "spatial medium" through which urban power relations were continually enacted and reproduced. Public projection offered a way of contesting this mythic dimension of power at its source:

¹⁵ See https://www.tourism.gov.hk/symphony/english/details/details.html.

¹⁶ Examples include the drone display Written in the stars that was part of the annual Vivid light art festival held in Sydney in May-June 2023. See https://www.youtube.com/watch?v=tjt4vBog9QU.

Public visualization of this myth can unmask the myth, recognize it "physically," force it to the surface and hold it visible, so that the people on the street can observe and celebrate its final formal capitulation. This must happen at the very place of myth, on the site of its production, on its body – the building. Only physical, public projection of the myth on the physical body of the myth (projection of myth on myth), can successfully demystify the myth. (Wodiczko 1983, 186)

Wodiczko's more recent projects have taken this approach a step further. A salutary example is his project staged in Weimar in 2016, which involved projection onto the imposing Goethe-Schiller monument erected in 1857. This monument to the two most esteemed German writers is one of the most famous in Germany. It has been credited with inspiring a "cult of the monument" with dozens of similar statues being erected across Europe and also the USA.



Figures 7 and 8. Krzysztof Wodiczko, Phoptographs from *Weimar Projection*, on-site projection, Weimar Theater Plaza August 26-28, 2016 KuntsFest festival, during Goethe's birthday celebrations. Available online at https://www.krzysztofwodiczko.com/public-projections#/weimar/. Photographer not named. Wodiczko's project involved interviewing refugees, mainly from Syria and Afghanistan, about their experiences in coming to live in Weimar. The video recordings made with participants were then mapped onto the statue's dimensions and contours, enabling participants to temporarily "occupy" this monument with their own faces and bodily gestures. As Wodiczko notes: in this way "Refugees could become Schiller and Goethe in real time" (Wodiczko 2017, 39). In addition, a podium was erected to allow questions to be posed by the audience. Live responses from the refugee participants, situated in a nearby studio, were relayed onto the statue. Constructing this new "feedback circuit" moves the project from symbolic contestation focused on the statue towards a more explicit role as a temporary, experimental public sphere.

Transforming the Goethe-Schiller monument using refugee faces, gestures and voices is a particularly powerful gesture. We should remember that Schiller was himself a refugee. He was a doctor who had deserted from the army, and had to cross several checkpoints to get to Weimar. He was eventually protected on his arrival by Goethe. The square in which the statue commemorating their meeting is situated is the site where the Weimar Republic was formed in 1918 and where the national assembly met until the fascist takeover in1933. Wodiczko's project recollects this complex history and uses it as an opportunity for creating a unique form of contemporary public testimony.

These different practices – from the use of AR in mobile phone apps to the growing role of dynamic lighting and digital projection in the contemporary city – indicates both the range of techniques as well as the diverse ambitions these practices can encompass. Where some projects involve deliberate contestation of the symbolic heritage of the city, others seek more ambient effects, or seek aim to consolidate state power or brand image. This spectrum of uses maps onto the ambivalent trajectories that characterize the geomedia era and the digitization of urban infrastructure, where new possibilities for individual and collective expression are constantly counterpointed by new capacities for consolidated power and control.

5. Immersed in Data

This brings us to one of the most important differences separating light art projects in the 20th century from those using digital media to alter the dynamic of public space in the early 21st century. A key aspect of the contemporary digital city is enhanced capacity to collect, assemble and analyse data of all kinds. We've now arrived at a stage where this doesn't require a special apparatus: instead, mass data capture has become embedded in everyday urban operations. The kind of mass surveillance that has become the dominant business model of digital platforms, initiating what Shoshana Zuboff (2019) aptly describes as "surveillance capitalism," has expanded into urban space as a core element of the digital city. New practices of datafication and capacity for large-scale data extraction have propelled the rapid rise of "smart city" agendas all over the world. These are all-too often imagined as command and control systems dedicated to what engineers term "optimization" – without asking basic questions such as optimized for who? To what ends? (McQuire 2020).

Vastly heightened potential for data extraction is pivotal in differentiating the 21st century digital media city from the older electropolis. We are no longer immersed in electric light alone but also in data. *This* augmentation has become a central part of the invisible environment of the contemporary city, and is fast infusing a new urban imaginary. Growing access to diverse data sources and new computational capacities has underpinned rapid advances in machine learning and automated decision-making – so-called "AI" – over the last decade. What happens when the digitized urban environment starts to become "self-organised?" We can already see intimations of this, from the use of algorithms in risk modeling around who gets bank loans or insurance policies; or in the adoption of machine learning for planning the allocation of policing and emergency resources (Safransky 2020). It is also evident in the new modes for controlling urban movement using data mining, pattern recognition and largescale urban surveillance that were rapidly deployed as in the context of global Covid lockdowns.

We also know - or should know - that neither data nor algorithms are ever neutral or objective. Data always has to be selected, cleaned and made machine-ready. This involves trade-offs in terms of completeness as well as "bias" in Innis's sense, relating to the particular orientation of any medium or technology. Algorithmic techniques are also developed in specific social and institutional settings, with all the pressures and prejudices this entails. While new forms of machine-learning are clearly capable of generating novel insights into complex phenomena, they can also automate and obscure the reproduction of existing social hierarchies such as racialised or gendered biases. To recognize this is not about refusing "progress" or embracing technophobia. Rather, it is to argue that contemporary developments in digital media including new forms of machine learning and automated decision-making cannot be comprehended by a narrative which simply opposes "technology" to humanity - as if being human is a fixed and static quality. As philosopher Bernard Stiegler (1998) has argued, technology - in the broadest sense of *techne* referring to both capacity to use symbols and tools - has always been part of being human. But it is that that strange part which propels human evolution by taking us outside ourselves, resulting in an ongoing process of technological "exteriorization" that constantly reworks the terms of our "inner" being as well as our relations to others and to the world. This is why recognizing the new terms of this invisible environment that conditions social life has now become an urgent challenge. History shows that technological systems are much harder to alter or wind back once

they are established and embedded. Contemporary decisions about how the city is digitally instrumented will play a big role in shaping urban social life in the future. Will we continue to allow large-scale data extraction to become the normal fabric of life in the city? Or will we find ways to foster new forms of peer-based public communication that also support privacy and new forms of public commons? What interfaces, what information architectures, what forms of property rights and modes of governance might this involve?

How we answer these questions will also inevitably shape future ways of "being human." This brings me back to the questions I raised earlier about the relation between new technology and human sensory perception and modes of sense-making. There is a long history of concern about sensory overload as an effect of the modern city. You can find this at least since Nietzsche, Freud, and Simmel and it remains evident in much contemporary discourse about the networked city as an "augmented" urban environment. But, as much as I think there is an urgent need to develop critical perspectives about allowing data extraction or the spectacular commodification of public space to become the default conditions of the 21st century city, there is equally a need to remain open to asking whether our densely layered and always-on "augmented" urban environment is contributing to the evolution of a new mode of attention. Almost a century ago, Walter Benjamin (2002; 2003) wrote about modern urban experience as characterized by a novel form of distracted perception. He argued that distracted perception should not be understood as an inherently negative quality, but instead suggested that it offered a way in which reception of new cultural phenomena could potentially elude the established patterns of filtering that characterized conscious reception. Distracted reception could potentially lead to new forms of association and modes of understanding.

His provocation remains relevant today. If we only evaluate our experience of the "augmented" environment of digital media city using the tools of traditional phenomenology, or the forms of attention that characterized the connoisseur of painting or even the film spectator sitting immobile in front of a single image stream in a darkened cinema, we are likely to miss what is most distinctive to contemporary urban experience. As an augmented *environment*, contemporary urban space involves the conjugation of multiple elements that lack a domineering centre. For this reason, being immersed in the augmented environment of the networked digital city produces a field experience more akin to *ambient perception*, to adopt the term that Brian Eno introduced to music. Re-imagining and re-designing the future city to accommodate *this* new mode of perception demands a constant and deep consideration of the ongoing experiment into relations between human senses, media interfaces, and urban spaces that is being conducted in cities all over the world.

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