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# SCREENS FOR URBAN DATA DRAMATURGY<sup>1</sup>

*Meaning is use, as Ludwig Wittgenstein famously said, to which we can add, such use is always circumstantial and situational.*

Johanna Drucker (2013)

*In the Air Tonight* by Public Visualization Studio is a public art installation in public space that uses light and architectural surface for the visualization of local, urban data via the LED façade of the Ryerson Image Center in Toronto. It is a temporary but recurring installation for an existing and fixed architecture. It was on display for a month in 2014, and again in 2015 and 2016, with the aim to raise awareness about homelessness in the city. Throughout the cold winter evenings, a blue wave on the facade displayed fluctuating information about changing temperatures and wind speed. With the color blue, it visualizes the feeling of being outside and exposed to the elements. This presents a translation from one sense (touch) to the other (sight). The data in-between – from qualitative to quantitative and back – came from a weather station located on the roof of the building. Tweets that use the hashtag #homelessness generated a red pulse on the building’s surface. In response to financial donations, the façade intermittently turned white. A webcam enabled remote participants in the project to witness the building change colors in real time.<sup>2</sup>

This work makes use of the material architecture in which it is embedded to combine principles of *sensing*, *interactivity*, and *display*. The work makes visible and present what is otherwise hidden and as such raises awareness about the intersection of social and environmental issues that are specific to contemporary urban space. As an “object to think with,” this installation compels us to zoom out from the *surface* of screens to their *situation*. This situational perspective, I will argue, entails a shift from data *visualization* to data *dramaturgy*.

*In the Air Tonight* embodies many of our contemporary fascinations: public spectacle and event culture, the presence of data and experimentation with data visualization, and the affordances of sensing technologies and responsive displays. In the following, I discuss *In the Air Tonight* and some other urban media art installations, treating these works as vehicles that can guide us toward a more in-depth understanding of the ways in which remote sensing and display technologies can be used to address local spectators as responsible subjects – or literally, “engaged citizens” – by putting them into new sensory relationships with and within their urban environment. These works stand for a wider variety of installations and displays that infuse ma-

terial, architectural surfaces in our urban, public spaces with *matters*, both in the sense of materiality and of social concern, by means of light and reflection—the latter in its double meaning of image and thought. These installations compel sensations: the activation of the senses that allow human bodies and minds to perceive and communicate with one another and with their material environment. Sensations are events of such activations. Here, I am specifically interested in how this infuses local, digital data with meaning. As interface theorist Joanna Drucker phrases this succinctly, “Meaning is use, as Ludwig Wittgenstein famously said, to which we can add, such use is always circumstantial and situational.” I propose that we can also add that use is not a *result*, but an *event* which happens – emerges – in this situated present. <sup>3</sup>

### **Spectatorial Territories: Sensing Situated Data**

In the Western tradition, we distinguish five senses, some of which we assume to require direct bodily contact (touch, taste) while others only need bodily tools—such as ears for hearing, noses for smelling, and eyes for vision. Vision is usually considered the most “remote” of the senses, the one most capable of connecting over distances—even if there, too, sensing is based on the material contact of light. Today, we use the term “remote sensing” to describe technology-driven productions of visual sensations at great distances; yet this term in fact describes nothing more than an extension of what (human) vision has always been capable of doing. Only the particular sensations produced, the experiences compelled, and the effects created by these two forms of “remote sensing” differ from one another. Hence my claim that it is the situation, aided by technological affordances, that can make for a different kind of sensation that, being only “remote” in appearance, is capable of encouraging engagement with our environment. With their display and interactive visualizations of remote sensing, the installations I discuss produce effects for the viewer that they can process as sensible materials, according to my understanding of the relation between the senses and the sensations they produce. An important element of these works is that these sensations function, and thus have an impact, in and on public space. This is where visualization becomes a matter of dramaturgy.

Dramaturgy is here taken in an expanded sense, as also proposed by Cathy Turner, to encompass “performance structures beyond the theatre setting and in an interdisciplinary context” – a setting and context of architecture, for example. Dramaturgy may provide us with a lens on how screen-architectures as installations of “sensible materials” make meaning.<sup>4</sup>

To explore this dramaturgical perspective, I will consider how these sensing

screens shift their operations from surface to situation, and thus conceive of their work as *situated*, *architectural*, and *eventful*. In particular, I focus on works that visualize data generated from elsewhere. The screen projects under scrutiny here experiment with both surface and situational qualities as they “work with” digital data that is either extracted from their direct environment—the spaces within which they are situated—or from more distant locations with which they are connected by means of various sensing and display technologies. As interfaces, they give access to this data, they visualize and display data, but they are also designed to create emerging, spatial stories – they are screens for data dramaturgy.<sup>5</sup>

In addition to *In the Air Tonight* I will also consider two other examples of the contemporary urban installations, both by Los Angeles-based artist Refik Anadol. Many of Anadol’s installations interrogate the conventions and push the limits of architectural screen-spaces. His *Infinity Room* and *Virtual Depictions: San Francisco* will be central in my argument. Anadol significantly calls these works “data sculptures,” but in view of my interest in their spatial design I propose the term “screen-architectures” to describe them and include them in a larger category of architectural urban media art.<sup>6</sup>

These specific cases serve as my *theoretical objects*. That is, I look to specific artworks in order to explain the wider “genre” of contemporary screen-architectures, a genre that I consider to be fundamentally site specific, or rather, *site responsive* (Morra 2017). Screen-architectures enable and propose various forms of interface between an individual and his or her surroundings, whether those surroundings are immediate or more remote. These screen-architectures display not only spectacular optical sights, but also produce emergent environmental situations.<sup>7</sup>

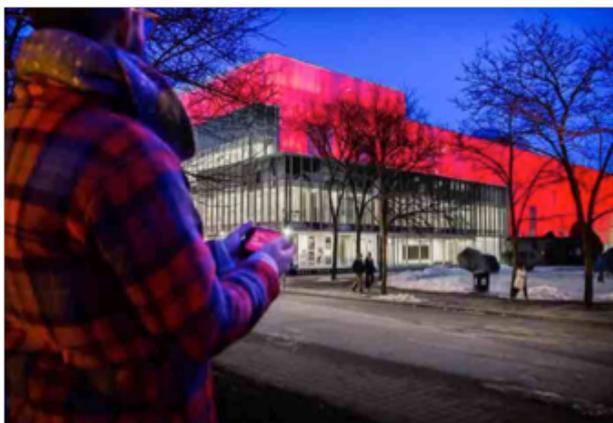
Once we understand the screening dispositif as a fundamentally material and spatial arrangement, we can further analyze this arrangement as a spectatorial territory: it not only produces a spectator, but also the territory within which spectatorship can occur. The particular screening situation of each spectatorial territory is layered and porous: each territory is permeable and opens up to other spaces. As I have argued elsewhere (2012), mobile screens and location-based technologies have reorganized traditional screen-based dispositif in a variety of ways. Not only have they given screens a sense of physical mobility, means of vehicular, portable or wearable transportation, but they have also shifted the terms of interactivity and spectatorial agency. They make the spectator mobile in multiple senses of the word. But there is also a mobility implied in the variability of screen operations, given that digital interfaces afford many different uses. Hence, mobile screen technologies reveal the screening situation to be fundamen-

tally performative. Our processes of interfacing with screens within a dispositif, and the ways we actively engage with those screens, produce complex, changing and interactive spaces. This process is a making of place that renders that place emergent; the place that hosts a site-specific screen is not pre-existing. Hence, the interfacing of viewer and screen is not only situated as in *taking* place in a particular location. It also *makes* place as it creates or influences surrounding (urban) spaces. In this sense, it is also *situating*.<sup>8</sup>

### Site-Responsivity: From Translation to Transformation

In view of my brief description of this work at the beginning, let me now first address an interactive urban installation that shares the ambition with various other projects to raise awareness and solicit civic participation in urban social issues.

*In the Air Tonight* is an example of responsive architecture used for (real-time) data visualization that raises social awareness about these data by deploying and reflecting on sensing technologies. Under the surface, it is more complex than meets the eye, due to the way in which the interface translates a social issue (homelessness) into physical and experiential categories (feeling cold). It transfers something we can *measure* (temperature) and subsequently *evaluate* and *display*. Here, this display has a metaphorical visual form; a blue wave signifies “coldness.” Yet it combines one data source (temperature) with



*In the Air Tonight*

other information (such as the number of tweets using the hashtag #homelessness), thus drawing different registers of information from different locations and materialities, and symbolizing different indexical relationships. The installation makes a connection between very different spaces, situating and making digital communication visual and hence sense-able. This particular form of interfacing makes perceptible the urban challenges we often take for

granted, and this transformation represents an attempt to change our attitude. As such the installation aims to produce attentiveness and reflexivity, and to compel viewers to action. The spectator is positioned as a conscientious citizen, aware of the presence and situation of others. This may stimulate donations, which might help to improve and transform the environment surrounding the installation itself.<sup>9</sup>

Responding to this immediate environment—that is, its site of installation—the work demonstrates how data visualization not only communicates data from and about “here” and “there,” but also produces an interface between these disparate spaces. As such represents the “now” of the viewing subject in relation to this data as it extracts, translates, connects, makes present, produces relations, makes visible, and perhaps most pertinently, performs *sensing*. The thrust of urban projects like *In the Air, Tonight* is to activate local publics by stimulating reflection on their situation, and transforming this reflection into social action. Sensing thus implies distilling information from the environment in order to become attuned to it, and in order to respond to its particulars. Sensing is not only subjective, but also social; it can thus put the self and the senses in an ethical relation to others.<sup>10</sup>

Joanne Morra has proposed that we consider as “site-responsive” any artwork that responds to its site of installation. An installation can act site-responsively when a work engages a space that is not primarily a site for exhibition. Morra writes that site-responsive interventions aim “to render historical space contemporary, to critically engage with the museum, its collection, display strategies, narratives, and history, or to open the space up to a broader cultural context that includes artistic practice.” It can activate potential narratives, experiences and meanings not otherwise obviously primary in the experience of the space. As a result of this activation, the work responds to the site and enables us to understand it differently from how we routinely perceive it. Because the viewer and the work interact, there is a clear reciprocity at play. “Site-responsivity,” Morra writes, “acknowledges the way in which the artworks and space dynamically relate to, and respond to, one another.”<sup>11</sup>

This work in Toronto produces a new situation that moves very literally from the environment to the surface, and which feeds back into the environment: environmental data about the climate affects a visual display, which in turn transforms its environment. I wish to underscore how this relation is not based on a one-directional causal process, but is inherently entwined. Accordingly, I propose we understand these screen-architectures as site-responsive urban interfaces. This change in terminology emphasizes how the screening situation not only takes place within a space that produces subjectivity, but also produces a spectatorial territory that allows action and transformation

to emerge. While we perhaps tend to understand screen-based spectatorship first and foremost as based on attraction or immersion, we see here how site-responsivity combined with interactivity may yield situations that are performative: fundamentally emergent, dynamic, and transformative of the subject.

### **Data Dramaturgy: Drowning in Dimensions**

The following case may seem a bit exceptional—let’s say, literally out of place—considering my focus on public screening situations. Contrary to exterior displays that cover the city’s building facades, Refik Anadol’s *Infinity Rooms* are closed interiors that fully immerse the spectator in an abstract spectacle of light and sound. It is difficult to describe in words what we see in the rooms. Changing black-and-white light patterns (projected by lasers) surround the spectator. Mirrors in the small space visually efface the surfaces of walls. Engulfing sounds accompany the flow of light patterns. In this audio-visual spectacle, the visitor loses the visual boundaries and surfaces that typically serve as points of sensory reference. The projections of kaleidoscopic light patterns visually encompass the spectator and fill his or her entire field of vision, without the borders of a frame, and without discernable walls, floor, and ceiling. As a consequence, the illusion of being both detached and then immersed is very powerful.

The work has appeared in various settings—for example, at the Istanbul Biennial (2015) and the SXSW festival in Austin, Texas (2017). Thus, the rooms travel and become *site-adaptive* – an adaptive form of site-specificity characteristic of many traveling installations that appear different locations and for different publics, in each instance framed differently by the various occasions of their “happening.” Another example would be the project *Portals* by Shared Studios, which places in various locations shipping containers that contain screen-based connections by means of live video links to other locations. Or, as the exhibition text by Shared Studios announced: “Portals are gold spaces equipped with immersive audiovisual technology. When you enter a Portal, you come face-to-face with someone in a distant Portal, live and full-body, as if in the same room.”<sup>11</sup>

*Infinity Rooms* present abstract visual forms based on programmed algorithms. Rather than a visualization of data from outside or elsewhere, the visual spaces that are created, here, by means of these algorithms, constitute radically new and emergent environments. This shift from transmission and representation of data to a construction of data space radically impacts the spectator’s optical and sensory experience. Anadol’s immersive and boxed-like installations are perhaps more similar to early Virtual Reality, or



*Infinity Rooms*

the CAVES (*cave automatic virtual environments*) that were developed in the nineteen-nineties. The difference there, however, lies in the position of the subject: rather than immersive only, enticing people to drown in dimensions, Anadol's installation is inter-active in the active sense. The spectator's awareness of his or her own body is not effaced, but, instead, foregrounded.<sup>13</sup>

The work seems to be inspired by two trends that, put together, create a paradox. On the one hand, in statements on his website, the artist suggests that various screen technologies have caused us to become increasingly detached from our direct

environment. This produces a sense of displacement. On the other hand, his artworks install a media architecture that makes explosive and innovative use of light and screen technology. Anadol thus proposes a temporary synthesis of the two poles of this paradox, between the displacing effects of media, on the one hand, and their production of new, albeit temporary, spatialities on the other. His *Infinity Rooms* are part of an ongoing project that he calls "Temporary Immersive Environment Experiments," intimating his attitude towards this paradox. Anadol understands the immersion produced by his *Infinity Rooms* as a "state of consciousness where an immersant's awareness of physical self is transformed by being surrounded in an engrossing environment; often artificial, creating a perception of presence in a non-physical world."<sup>14</sup>

The artist creates the impression of boundlessness by taking away borders and surfaces, and he uses immersion to achieve that effect. This immersion is, here, the result of the strategic production of a limitless visual space. There, the visitor's disembodied visual experience breaks with the dimensions of our common perception and experience of space. However, with these installations, he aims at more than just disorientation:

In this project "infinity" is chosen as a concept, a radical effort to deconstruct the framework of this illusory space and transgress the normal boundaries of the viewing experience to set out to transform the conventional flat cinema projection screen into a three-dimensional kinetic and architectonic space of visualisation by using contemporary algorithms.<sup>15</sup>

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projection screen into a three-dimensional kinetic and architectonic space of visualisation by using contemporary algorithms.

The suggestion here is that the transgression of borders can create a disorientation that produces transformation. And that is, of course, the point. One might describe this as producing a different kind of spectatorial territory, an alternate scenography in which the screen becomes coterminous with every interior surface, rather than serving as a singular focal point of attention, as in classical theories of the dispositif.<sup>16</sup>

The work's elimination of boundaries troubles the certainty of perspectival viewing inherent in the model of a single screen facing an audience. As Maaïke Bleeker has written, perspectival projection "creates a 'scenographic space' in which all that is seen is in a sense staged for a viewer. At the same time, this staging aims at an effect that is quite the opposite of being theatrical: the promise presented by perspective is one of directness, immediacy, it is the promise of Alberti's *finestra aperta*." (Bleeker, 99) In connection to the work's realization of a reversal of Alberti's promise, I invoke a quotation by Anadol of speculative architect Liam Young about, what he calls *data dramatization*, or data visualization as story-telling principle: "Data Dramatization, as opposed to data visualization presents a data set with not only legibility or clarity but in such a way as to provoke an empathetic or emotive response in its audience." As Anadol put it: "the experiment intends to question the relativity of perception and how it informs the apprehension of our surroundings." Anadol's installation works thus suggest that a scenography for the screen as surface, works towards a dramaturgy of situation.<sup>17</sup>



### Moving Surfaces: Situating Spectacle

*Virtual Depictions: San Francisco*

Another project by Anadol that addresses this is the video wall for the 350 Mission building, *Virtual Depictions: San Francisco*. Visible from the street,

but displayed behind a large glass façade, the work is literally situated both inside and outside of public space. It is a media wall, a screen surface that wraps around corners and which has the visual effect of a thick mass. Called a “parametric data sculpture” by the artist, it is a work of screen-architecture: between screen surface and material, it is an architectural component.

It displays fluidly changing abstract vistas—sometimes colorful, sometimes black-and-white—that, with special optical effects, visualize and animate otherwise static numeric, digital data from various sources. Though made visible and animated, this data is not “legible” as such; there is no way to interpret or distil information from these spectacular and also enigmatic visuals. The images are abstract and are not accompanied by a legend, scale table, or other tools for interpretation. For example, the media wall might display geographical information about online Tweets, but not in a map-like, readable image. Instead, the data sets are translated into a gripping visual spectacle. A trompe l’oeil effect enhances the kinetic and haptic appearance of the screen and its images, whose movement makes it seem as though the visual material protrudes from and almost spills out of its frame. This makes the screen, indeed, look more like a moving sculpture than a flat surface, even if the latter is the physically the case.

The work establishes an architectural hybridity. Its mobile surface expands and transforms its surroundings. It makes dynamic not only the appearance of the material structures, but also suggests permeability of its terrain. A crucial part of the work’s situation is its positioning behind a glass façade, which displays flowing spectacle of digital data layered under the reflected image of pedestrians passing by. As screen-architecture, this work expands and infuses its environment with optically vibrant visuals. Its visual suggestion of material fluidity brings life into the static surface of the façade. It speaks to our senses as we behold its movement. It is spectacularly beautiful, and firmly situates its spectacle. But does the spectacle also situate us, or do we just look at it?

The sensing and sensuous site-specificity of these works raises questions about the specificity of their aesthetics. The three works discussed here as theoretical objects, in the frameworks of remote-sensing, spectatorial territory, and site-responsivity respectively, all explore the relationship between the screen and its situation—how the one infuses and intervenes in the other, and vice versa. The (remote) sensing technologies that enable these data visualizations – or better, data dramaturgies – reference the direct contact of bodily senses such as touch. How, then, ought we to understand the subject’s own position and agency within this spatial screening situation?

I want to suggest that by screening, filtering, and territorializing, these works have a relationship of what we can call “curating” to the subject, in three different ways. First, the works design the space in which the subject is situated, and construct, or curate this space as emergent. Second, these works also curate data, by filtering: selecting, processing, showing, and activating it. Third, as interfaces to this data, these works also curate a field of relations. Enclosing the subject with screens establishes a territory that is paradoxical, physically closed, yet apparently infinite. Screens in these works establish multiple pathways between a viewing subject and the data they display, so as to produce a dispositif through which subjects can constitute and transform themselves. This, then, is the emergent and relational situation that they produce: the territory of spectatorship’s emergence. Hence my earlier claim that screen-architectures generate situations which can instigate specific kinds of sensation and which stimulate relational connections so as to infuse our environment with active, and actively curated, subjectivities. The kind of spectatorship varies, however. The first example aims to create a social consciousness in the spectator by linking specific stimuli to specific data, but the last example does not. This work creates lush patterns and effects of relief that don’t allow one to recognize data in familiar forms.

## To Conclude

What is at stake, then, when we consider the screen as a situation? The works that I have focused on all mobilize the senses. *In the Air Tonight* deploys color to convey temperature, for example. Anadol’s *Infinity Rooms* mobilizes tactility—since going inside is a tactile experience—as well as hearing, since the smaller, emergent space amplifies the sound. They also enhance, but “problematize” vision through their disorientating effects. As such, the rooms simultaneously isolate and augment the visitor’s senses. In *Virtual Depictions: San Francisco*, the senses are more or less limited to vision, even when the work’s haptic texture invokes the idea of touch. The work’s animated materiality turns vision into more than itself. It makes vision tactile, and hence, binds the viewers to itself through mobilizing the desire to touch what they see, and thus to come closer.

All three works use data dramaturgies to truly impact the environment through a binding effect of the screen – binding the subject with the work’s surrounding (public) space via the senses. More than just positioning the subject, binding implies that the subject is invited, provoked maybe, to position him or herself in a bond with the environment. *Situation*, as I have used the concept here, implies that relations are not detached from the subjects; on the contrary, the subjects are solicited to participate in these works, and will want to engage with them.

These installations, with their “high-tech” look and feel, strongly evoke the idea the contemporary: they project a sense of being in the now, and (with consideration of the spatial aspect) in the here-and-now. By bringing the subject into direct relation to her environment, their type of screening is fundamentally and explicitly situational. Indeed, urban screen interfaces compel social engagements with the environments that surround them—including the city’s problems, such as homelessness and social disconnection. Thus, the situation becomes as “animate” as the works’ moving images. We can say that these installations are exemplary acts of sense-making: shaping the situation in which subject and data is brought into sensitive connection – a sensuous dramaturgy of urban data.

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## Notes

1 An extended version of this essay that includes a historical-compara-

tive perspective on sensing screens will be published in *Screens Unbound: From the Optical to the Environmental*, edited by Craig Buckley, Rüdiger Campe and Francesco Casetti. Yale University Press (forthcoming).

2. For more information about *In the Air Tonight*, see <http://intheairtonight.org> (accessed November 2017).

3. Drucker Johanna. 2013. "Performative Materiality and Theoretical Approaches to Interface." *DHQ: Digital Humanities Quarterly* 7, 1.

4. See Cathy Turner, 2010. "Mis-Guidance and Spatial Planning: Dramaturgies of Public Space." *Contemporary Theatre Review* 20, 2: 149–161 (150). I want to thank Sigrid Merx for bringing this essay to my attention and for her feedback on this dramaturgical perspective.

5. On screen-based installations, see Kate Mondloch. *Screens: Viewing Media Installation Art*. Minneapolis, MN: University of Minnesota Press, 2009.

6. Anne Friedberg has made the most convincing claim for this architectural perspective on the screen, in her landmark work, *The Virtual Window: From Alberti to Microsoft*. Cambridge, MA: MIT Press, 2006.

7. Hubert Damisch introduced the notion of theoretical objects, saying that such an object "[...] obliges you to do theory but also furnishes you with the means of doing it. Thus, if you agree to accept it on theoretical terms, it will produce effects around itself ... [and] forces us to ask ourselves what theory is. It is posed in theoretical terms; it produces theory; and it necessitates a reflection on theory. (Bois et al., 1998, 8). As Mieke Bal (2010, 8) has pointed out, his concept "sometimes seems to suggest these are objects around which theories have been produced. At other times, [...] he attributes to the artwork the capacity to motivate, entice, and even compel thought." In line with this latter capacity, I attribute to the works a theorization of their own status as elaboration of this genre of "sensing screens".

8. Nanna Verhoeff, *Mobile Screens: The Visual Regime of Navigation*. Amsterdam: Amsterdam University Press, 2012. Erkki Huhtamo discerns vehicular, portable, and wearable mobile (screen) practices. See his "The Four Practices? Challenges for an Archaeology of the Screen." 116-124 in *Screens: From Materiality to Spectatorship—A Historical and Theoretical Reassessment*. Edited by Dominique Chateau and José Moure. Amsterdam: Amsterdam University Press, 2015.

9. Nanna Verhoeff and Karin van Es, "Situated Installations for Urban

Data Visualization: Interfacing the Archive-City.” In Pedram and Judith Naeff (eds.), *Visualizing the Street. Cities and Cultures*. Amsterdam: Amsterdam University Press, 2018. For a comparable installation that neatly resonates with the title of the present article, see *Sensing Water* by Seattle-based artist Dan Corson. For more about this work, see <http://dancorson.com/sensing-water> (accessed June 2017).

10 Urban screens and installations and their possible use for social awareness and civic participation are usefully discussed in Susa Pop, Tanya Toft, Nerea Calvillo, Mark Wright (eds.), *What Urban Media Art Can Do: Why, When, Where & How*. Stuttgart: avedition GmbH, 2017. About sensing technologies, smart technologies and urban experiences, see also Mark Shepard, ed. *Sentient City: Ubiquitous Computing, Architecture, and the Future of Urban Space*. Cambridge, MA: MIT Press, 2011.

11 See the Introduction in: Joanne Morra, *Inside the Freud Museums: History, Memory and Site-Responsive Art*. London: I.B. Tauris, 2017.

12 See <http://www.sharedstudios.com> (accessed November 2017).

13 See Carolina Cruz-Neira, Daniel J. Sandin, Daniel J.; Thomas A. DeFanti, Robert V. Kenyon and John C. Hart, “The CAVE: Audio Visual Experience Automatic Virtual Environment.” *Communications of the ACM* 35 (6 (June 1, 1992): 64–72. Interestingly, Anadol also experimented with VR versions of his Infinity Rooms, but prefers the material, architectural version. In his words: “We have so many opportunities in the physical world that we have never explored. [...] If you know this much better, then the leap to VR experiences will be much more meaningful, much more impactful.” Quoted in Aaron Souppouris, “Inside ‘Infinity Room,’ A Dazzling SXSW Art Installation”. *Engadget* 13 March 2017. <https://www.engadget.com/2017/03/13/refik-anadol-infinity-room-video> (accessed June 2017).

14. See <http://www.refikanadol.com/aboutrefikanadol> (accessed June 2017) and <http://www.refikanadol.com/works/infinity-room> (accessed June 2017). On media architecture, see Alexander Wiethoff and Heinrich Hussmann (eds.), *Media Architecture: Using Information and Media as Construction Material (Age of Access? Grundfragen der Informationsgesellschaft)*. Berlin: De Gruyter Mouton, 2017.

15 See <http://www.refikanadol.com/works/infinity-room> (accessed June 2017).

16 Dramaturgy as a critical concept is discussed in Cathy Turner and

Synne Behrndt (eds), *Dramaturgy and Performance*. Basinstoke, UK: Palgrave, 2016. For more about dramaturgy in relation to digital media, see Peter Eckersall, Helena Grehan, Edward Scheer (eds.), *New Media Dramaturgy: Performance, Media and New-Materialism*. Basinstoke, UK: Palgrave, 2017. On scenography, see Joslin McKinney and Scott Palmer (eds.) *Scenography Expanded: An Introduction to Contemporary Performance Design*. London: Bloomsbury, 2017.

17 Refik Anadol quoted Young in his presentation at Fiber Festival in 2017. See also <https://medium.com/@memoakten/data-dramatization-fe04a57530e4> and Holly Willis, "Sense and the City: Liam Young's Speculative Cinema." *Mediapolis. A Journal of Cities and Culture* 2 (June 7, 2017). <http://www.mediapolisjournal.com/2017/06/sense-city-liam-youngs-speculative-cinema>. Surface is a cultural issue in many different fields. For an interdisciplinary take on surfaces, see Giuliana Bruno 2014. *Surface: Matters of Aesthetics, Materiality, and Media*. Chicago, IL: University of Chicago Press.