Weightless Infrastructures

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Considered as an artistic medium, airwaves are not neutral, nor are they immaterial. The decision to broadcast is linked to the decision to activate electronic circuits. Radio holds both propagandistic and subversive potentials. But even the most experimental broad- or webcasts rely on electronic or digital technologies. Thus, responsible radio productions cannot shy away from a self-critical, and political positioning in this regard. What political implications does it have for radio art that transmission rests on a system of energy-consuming technologies? This question calls for a theorization that nuances the idea of podcasting as an ephemeral and intimate medium. This article proposes the term *weightless infrastructures* in rethinking satellites as atmospheric, free-floating and free-falling technological infrastructures. This notion is abbreviated and used interchangeably with the following terms: *weightless technology*, *weightless hardware* and *free-floating infrastructure*.

1. INTRODUCTION

The sensory apprehension of satellites is not really a part of our visual culture. The visibility of satellites does not seem to guarantee an accompanying imagined physicality. They seem to be too far away to fully connect what is seen with what is physically there. We see satellites pass by regularly blinking in the night sky, and hardly notice them. Even this everyday observable sensory image of satellites is so entangled in the societal fabric of our existence that it becomes an ambient background phenomenon. Similarly, the internet is often conceived of as an immaterial phenomenon. Often referred to as 'the cloud', it is envisaged as an image of a weightlessly floating mass of condensed data in its vaporized form. Metaphorically, it is imagined to be an immaterial, almost metaphysical, abstracted substance that is not in need of any material infrastructure to exist. Available anywhere, it knocks out hardware costs and dramatically reduces the amount of IT resources required to run networks. Cloud technology and capitalism are inextricably linked. The internet means big business. So-called social media platforms such as Facebook, LinkedIn and Twitter are all capitalizing on our use of 'the cloud'. But the infrastructures for digital intermedia and telecommunications are far from immaterial. The so-called 'cloud' is not invisible but exists because of a framework of physical infrastructures.

To contextualize the research institutionally, it was conducted at the Laboratory for Artistic Research at the Royal Danish Academy of Fine Arts as a tangent to the artistic and practice-based PhD project 'New Connections: Queering the Radio Voice', a bi-institutional research project funded by the Novo Nordisk Foundation and inscribed at the Visual Culture Department at the University of Copenhagen. An early version of the text was presented at the conference-like PhD course 'Environments: Extinct, Envisioned, Envisaged' that was run at the Sandbjerg Estate of Aarhus University. Its motivation is self-critically preoccupied with the technological infrastructure the research depends upon. In the PhD project, the primary case study is 10 podcast episodes in English that were initially broadcast live (with a video image), depending on digital infrastructures in the webcasting situation. The podcast provides a platform for the dissemination of sound pieces, as well as live performed material. With these introductory remarks, hopefully this article avoids becoming a weightless infrastructure itself. The notion of weightless infrastructures is used to discuss the underlying premise of telecommunications and intermedia.

An important theoretical reference for this article is Trevor Paglen's concept of *vertical geographies* (Paglen 2016). In the article 'Some Sketches on Vertical Geographies', Paglen, who is contributing to the 14th Shanghai Biennale, develops an expanded concept of state borders that are not defined upwards. A very specific physical situation or domain very close to the surface of the earth provides the basic condition for life on earth – with a specific amount of oxygen and a certain gravitational pressure. The concept of weightless infrastructures can be understood as a *thinking with* Trevor Paglen in prolongation of this idea of vertical geographies. Considered as a weightless infrastructure, the satellite can be regarded as a monetized and frictionless object, in which every weightless cubic millimetre counts. Investment in and the motives and interests in installing these highly commodified objects in space are manifold. Many actors have lucrative interests

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in the establishment of such networks since the transfer of data is essential to the commodification of data.

2. EMISSIVE GRIDS

Since the invention of electricity, society has made a shift to the techno sphere. For instance, streetlamps were previously gas lit. With the implementation of electricity, a large-scale network of cables connects architectonic constructions. Local power plants have gradually been centralized, and, taking Denmark as an example, eventually privatized to a large extent. In different phases, suspended cables have been dug down to avoid frequent maintenance, and a cartographic overview of the dug down cables has become more and more detailed in order to avoid errors. In this way, the installation of electricity that provides the steppingstone for digitalization coincides with an effectivization of society and improved living conditions. Household appliances could eventually be powered directly from the sockets in the walls; thus, electricity became a domestic phenomenon. Radios, which in many regards are first and foremost sound objects both shaped by and contributing to shaping the domestic sphere, are part of a development in the industrialized societies in which comfort, technification and surveillance go hand in hand. In the beginning of the 1920s there were no radio factories in Denmark. Enthusiasts would purchase a DIY kit to assemble a radio themselves. During the 1920s, small manufacturers started making radios, while actual factories were started in the last half of the decade. The internet developed in continuation and as part of this electrification of society. Research at CERN by computer scientist Tim Berners-Lee in 1989–90 resulted in what would be known as the internet. The idea originally was to meet the demand for information sharing by scientists around the globe. In our partly digitized transnational framework, the theoretical analysis of what environmentalism entails must take the full materiality of the total mass of electronic circuits into account. Providing an airborne pathway for electromagnetic signals, satellites are useful in contributing to the widespread, high-speed dissemination of data signals. The use of data is not only in itself valuable. It also guides the big tech companies in the consumerist patterns of the users of social media platforms. Satellite dishes and antennas are by now replaced with cell-sites installed on towers, chimneys and other tall structures in many places. Cell-sites are everywhere. Everywhere there is a wireless connection, a cell-site is situated somewhere in the nearby area. Most broad- and webcasting is transmitted via underwater cables connected to cell-sites (Paglen 2016).

Sound is often conceived as an immaterial and ephemeral format. But auditory processes are obviously always somewhat material. In dissemination, broadcasting technologies rely on digital and electronic signal-processing infrastructures. The ephemerality of formats should not be confused with immateriality. Podcast sound files are materially stored on servers installed in very material architectures in specific locations. In the foreword to his influential essay *The Work of Art in the Age of Mechanical Reproduction*, Walter Benjamin asserts the need to revise Marx's revelation of the forms of early stage capitalism. By proposing how art will tend to develop under current conditions of production, prognostic demands for how artworks will be produced in the future are made (Benjamin 2008: 2). This is in line with the aims of this article. It is true that sound materials carry a critical, subversive and transformational potential in the metaphorical and imaginative layers. New ways of organizing society can fruitfully be proposed in the radio format. This has also been done previously in the free radio movement in 1970s Italy, with the magazine *A/Traverso* and Radio Alice as the most well-known station. Another example is the 'Mini FM' boom in Japan. However, with the advent of web-based radio, and the flourishing of the podcast medium since digitalization took hold, the condition for producing radio needs to be revised, and the material circumstances for its production needs to be revealed. This article hopes to contribute, however insignificantly, to rethinking the radio format and to opening theoretical areas that can result in even more experimental ways of making radio art.

3. FREE-FALLING ENTITIES

Electricity is generated in energy systems ranging from solar power, wind turbines and hydro, to coal, gas and oil. Satellites are part of a network of cables, server farms and cell-sites, that makes the internet and other types of wireless communication possible. Digitalization is framed as an important step in the development of nation-state societies and used widely in nation-branding. However, the carbon dioxide footprint of the electronic circuits that drives the tech industry is often left unmentioned. The fascinating idea of calculating the trajectories of weighing objects mathematically, in accordance with the laws of physics, and launching technological assemblages into orbit around

Earth, at the exact right speed, tends to justify the evidently large carbon emission rocket launches require. Once in orbit, satellites reach a weightless state. Technically, they become free-falling, continuously falling entities that fall pass the gravitational pull from Earth. They are falling towards Earth, but so fast that they fall out of the gravitational field again and begin falling anew. Since there is a vacuum in outer space, there is nothing to stop this process. Satellites

are driven by solar power in combination with fuel-driven motor systems. Because of the gravitational pull from other celestial objects, combined with the irregular gravity field of Earth, the direction of the satellite needs to be re-adjusted a little from time to time. This means that in our dependence on an extraterrestrial framework of data disseminating units, we also commit to an ongoing maintenance or replacement of this weightless hardware. Satellites are essentially radio masts (LaBelle 2008) and cell-sites positioned in space that help to establish a wireless network encompassing the entire globe. As such, they are an orbital, anthropocentric extension of the planet – added moons. We are entering a developed phase of the space age in which an increasingly large number of private actors begin to have access to outer space. On the one hand, this could be described as a democratization of outer space; on the other, it is an increase in toxic carbon emission and the accumulation of space junk. Even within the extremely defined procedural regulations surrounding the launch of satellites, it is becoming increasingly difficult to find space for satellites within the spherical volume around the earth that is well suited for it.

4. CONCLUSION

Conceptually, weightlessness can be associated with streamlined, generic and corporate notions of efficacy that places production over political and ethical concerns. Weightlessness contrasts with being in an earthbound state. There is a sharp contrast between the weightless state of the satellite and the heaviness of the rocket. The satellite, this elegantly floating, thoroughly designed and delicate piece of hardware, depends on an enormous construction to reach its detached modus. It is part of the narrative surrounding satellite infrastructures that science has overcome the limitations of earthbound existence and broken through the barriers that used to make space inaccessible for human actors. In this type of science, gravity is regarded not only as a natural force, but also as a way of nature that needs to be overcome and controlled. In science fiction movies,

we see how many of our current everyday problems have been solved by technology. In the 1956 film *Forbidden Planet* a robot can produce a delicious meal in seconds or design a sexy dress by getting instructions from humans. The ultimate dream in the techno sphere is that our desires are met by technology.

In the beginning of this article, Benjamin's reiteration of Marx was touched upon briefly. However, a linear historical understanding seems inappropriate for an artistic research process that should ideally be open-ended, non-linear and processual. Therefore, this last section is set aside for a brief mention of Bergson's philosophical argument against linear understandings of time in *Matter and Memory*. According to Bergson, the past does not cease to exist but ceases to be useful (Bergson 2016: 149). In this way, time is not conceived solely as a linear progression. Illustrated in the diagrammatic memory cone, the totality of recollections accumulated in the memory is static, while the image of the body, which belongs to the actual representation of the universe, are intricately interlinked (ibid.: 152). In this article, the compound term *weightless infrastructure* is introduced in the field of artistic research to address the dependence of broadcast technology on electric circuits. It is in no way an argument against progressive radio; on the contrary, the term will hopefully inspire new ways of making radio and be of inspiration to any potential reader.

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