Faire image

Inscriptions,
espaces et
formes numériques

Sous la direction de
Gwen **Le Cor**
et Everardo **Reyes**

octaviana

What makes an image?

Inscriptions,
digital spaces
and forms

EDITED BY

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Topology of augmented spaces

Federico Biggio

Abstract

This chapter aims at describing the emerging medium of augmented reality through an examination of its topological dimension and its pragmatic functioning. Starting from the case of *urban-based interactive storytelling*, the idea of the web as topological space will be revisited, in order to simultaneously study the physical and virtual spatiality, as well as the writing and reading processes of the geo-localized data produced in a place. To emerge will not just a location-based model of user experience, but a more general user-centered interaction scheme, in which the spatial dimension plays an organizational and often thematical role in the actual user experience.

1 Writing spaces in augmented reality

The paradigm of *Internet of Things* and that of *pervasive media* have predominantly asserted in recent years, by prefiguring futuristic scenarios that can be matched with those drawn down by the phenomenon of *datafication* (Mayer-Schönberger & Kenneth 2013), to the extent that both are characterized by the unceasing production, activation and storing of *information* in form of *data* in the virtual and immaterial space of the Web (data about physical world, about its processes, about human voices and faces). Nonetheless, these new paradigms are progressively reasserting the importance of the physical and situated dimension of the digital experience, and after all, of the consequences in the virtual space generated by interactions in real spaces.

The possibility of reading (and detecting recognizable elements into) the physical space by the use of computational technologies recalls the main scheme of operating of augmented reality. Augmented Reality technology, according with Klaus Mainzer (2017, p. 35), produces a huge amount of data, with chances and risks: "fast computing networks, Big

Data and sensor technology open new avenues of fast data mining, pattern recognition, and profiling of products and persons in economy and society". He calls these infrastructures "cyber-physical systems", by referring to the observative processes of the physical environment by means of sensors and to the management of retrieved information. Here, for economy, we cannot consider *data-science* issues: instead, we propose a reflection on the topologies that these processes point to. According with the media scholar Bolter (1991), each writing technology owns a spatial dimension: it can be the space of the page, above which the text is manifested, the space of the archive, but also the space of the reading. This conception leads to conceive an evolution of the knowledge's forms developed by a culture during a specific historical period. For instance, the physical closeness of medieval libraries and archives witnesses of a very hardly access to knowledge; in the second half of the XX century, instead, with the spreadability of digital media (Jenkins, 2013), knowledge has become more accessible and user-oriented.

From a semio-cultural standpoint, we would like to question this spatiality at least from two points of view. By looking to the user's practices of crossing into an environment (both a real and a virtual one). The user movement produce information and, at the same time, determine which information can be displayed at each step. We therefore must focus on the previous management and design operations by means of which knowledge acquires a geo-located dimension, which correspond to the creation and supply of situated information ready to be collected in different ways.

In particular, the augmented space to which we refer is both the *physical* one, written by the technology of augmented reality, and the *hypertextual* one of the Web, crossed by the user in order to grasp information and increase his/her knowledge about the real world.

This conception applies particularly well to augmented reality projects classifiable as *urban-based interactive storytelling*, in which the territory and its history is communicated, through the use of geo-localized databases, according with narrative logic (Lughi 2015). On the other hand, the metaphor of the web as a topological space, dating back at least to

Landow (1992), may be effectively retrieved to understand the work of harvesting and manipulating data collected by sensors and tracking technologies in order to explain social phenomena in a quantitative way (*data-science*).

Thus, in this article we aim to overcome a merely narrative conception of the augmented space, conceiving instead augmented reality in a broader sense (as its pioneers understood it when they designed the first prototypes: as a tool for cognitive augmentation). Again, the term "augmented reality" points both to the processes by which virtual contents are produced by the interaction and displayed above a physical, and to the retrieval of geo-localized information by algorithmic technologies that operate in the web space.

2 Taking the control of the map

Nowadays when we deal with meaning-making processes in augmented environments, like those created by augmented reality, we must firstly to look to the physical spaces experienced by the augmented body, that conveys them different meanings at each occurrence. These spaces have configured in accordance with the figure of the *map*: often the map of a city, but also a metaphorical map, understood as a topological plan and numerical grid above which meaningful information placed, like the one activated by computer vision and eye-tracking technologies. This feature is not only a technical configuration, but refers to a knowledge design model that leads to associate the information to a specific space. In this perspective, the design process becomes a production process of a topology, by activating meaningful relations between the user, the digital device and the environment.

First of all, the map is a topological entity: a planar surface above which information are written and linked each other in order to foster the dynamical thinking. But the map can be also referred to the pragmatic dimension concerning its production and uses. According with Deleuze and Guattari, "the map is open and connectable in all of its dimension; [...] it can be torn, reversed, adapted to any kind of mounting, reworked by an individual, group or social formation [...] the map has to do with performance" (Deleuze and Guattari 1988, p. 12).

This is not the place to study in depth the pragmatic functioning of a map, even the digital one. It is enough to look, as suggested by the two philosophers, to the performative dimension through which it is experienced by a user: that is, understanding the map as a tool for writing and reading the physical space and, specifically, the *points of interest* located there. Its peculiar characteristic is the possibility of transforming the space according to user interaction, which is able to exert a certain type of control over it, and therefore also over the environment itself.

An augmented reality device allows to display, in real time, information relating to the place where the user is located. For example, a user who wears a wearable technology may be able to display information in accordance with his/her preferences, habits and desires, through an operation that obviously leads to disabling the natural understanding of the world by the individual, but also to deal with the informational overload (despite of 'cognitive augmentation', this process has been also understood several times in terms of a loss of control, and consequently has led to compare augmented reality to virtual reality, the technology in which the user is completely isolated from the outside world).

In a similar way, the *data-science* operations, through which a physical space is "read" by harvesting the information that geolocated devices and produces there, can be defined in terms of *augmentation* as well, to the extent that the user - in this case the data-scientist - is even computationally increased in the cognitive understanding of a place, and above all, of the socio-cultural dynamics that occur there.

No longer worrying that computational technology operates as a knowledge enhancement or deactivator: in both cases what is important to underline is the fundamental spatial dimension from which the emergence of meaning occurs.

In the first case, an ever-new virtual personal space is associated, from time to time, with a physical place belonging to the real world, which possesses, in addition to a position, its own physicality and tactility. In the second case, the spatial dimension is that of the hypertext, in which information are disseminated at the nodes. In the cloud – the database in which harvested information have stored – the user moves through

network of links and protocols, by interacting with interfaces (Application Program Interfaces), capable of converging disordered information into a single "cluster", coinciding with the computer of the user. Afterward, the information has displayed again according to topological and spatial criteria, and made available again, to be interactively read by another user. For instance, in Data Visualization hypertexts, information have arranged and organized in a topological and meaningful space that offers to the user a set of paths and actions to read it. Not only the space of text is significant, but also, according with David Bihanic (2015: 27), "the ever-evolving and user-driven representation within a given system, as well as toward a mutually dependent trio consisting of situated perception, cognition, and action, like a form of *cyberception*". According with him, data designer transforms spatial data representations into agile and thriving environments comprised of graphic objects in perpetual movement. This same route enable a new enactive notion of spatial perception, and at the same time, does away with 'computationalistic' information processing as a logical and sequential calculation that allows little to no wiggle room when it comes to considering alternative meanings within the experience.

In this perspective, it is exactly the map, and the logical engine which constantly produce it in real time, to be a communicative dispositive by means of which an augmented and datificated physicality becomes readable by the augmented and cognitively enhanced user.

3 The heuristic discovery

An essential feature of geo-based augmented reality applications is the occurrence of heuristic discoveries of virtual contents every time a series of actions is accomplished. Whether it's Ingress or Pokémon Go (to name the most famous, but the same applies to the artistic practices: see Geroimenko 2014), the user experience is always characterized by euphoria given by the condition of being situated in a privileged and liminal space, that between real and virtual, from which it is possible to discover and enjoy a new ontological dimension of the physical space. It is precisely for these reasons that augmented reality is nowadays conceived as an *enchanting* medium. But the same sense could be also associated with

artistic or entertainment experiences, such as the evocative works of art by Yayoi Kusama or the data art performed in live-coding events, whose textual forms suggest the idea of being immersed in a flow of data to which an aesthetic value is attributed.

Again, we can conceive discovery by focusing both on its content and on the pragmatic dimension that leads the user to this discovery.

The former, in particular, leads to consider the promise of an augmented visual experience through which the user discovers a deeper layer of reality. The goal of some of the firstly avant-garde AR applications was precisely to provide the user with a sort of "x-ray vision" allowing him/her to see a reconstruction in computer graphics of the interior of the physical object with which he/she interacts (whether it is an artifact or the belly of a pregnant woman).

In a completely different way, the design of the urban space with the predisposition of disseminated contents, often associated with urban storytelling projects, conceives heuristic discovery both as the objective of an audience engagement strategy and as a means to promote awareness of a place. The *BePart* project (www.bepart.net), for example, provided for the mapping of some major street art sites in peripheral neighbourhoods of some Italian cities and, subsequently, for the design of virtual contents to be used in augmented reality. It is interesting to note that the intention of enhancing the street art works was pursued with a view to enhancing the urban territory and, at the same time, of the same experience of use of the space by the citizen.

The narrative and "situationist" component of this second type of phenomena leads to privileging the pragmatic dimension of the media experience, interpreting the citizen as a contemporary *flâneur* who, like that described by Benjamin (1935), wanders in the city being caught by sudden visions featured by a strong aesthetic impact.

However, considering these phenomena as occurrences of some type of "cognitive augmentation" is difficult. It should mean to understand the extent to what these "visions" contribute to determine a cognitive enhancement of the user intelligence or, at least, the diffusion and

dissemination of information and content to be hypertextually *captured*. This is typical of map-making processes to achieve a new topological knowledge: John Rennie in *Short Making Space* (2004) deals with the genesis of visual forms of geographic and topological knowledge: the spatial discourse that leads to the emergence of a cosmography and topology passes through two steps that are the navigation (for instance toward the oceans) and the surveying of the land.

Finally, by recovering the idea of the topological web mentioned above, it is interesting how nowadays Big Data criticism deals with the concept of "heuristic" to refer to scientific research practices: "data may play a heuristic role and authentic discoveries can be made about culture with the appropriate use of quantitative tools" (Compagno & Treleani 2019, p. 2). This is the case, for instance, of projects by Human Relational Ecosystems, an Italian project led by Salvatore Iaconesi and Oriana Persico, aiming to achieve awareness of situated processes through artistic representations of the flux of data about specific urban places. It is exactly the process of harvesting and representation of these data to lead to achieve a new awareness of the place in which those data has been produced (an idea that, in our opinion, can also be applied to the case of the more "traditional" data-art).

4 The bi-planarity of the augmented experience

A third and final feature of the user experience in augmented reality still concerns the act of fruition by the user in a space, of which, however, the vertical and multi-level profile is considered, compared to the topological and horizontal one before analyzed.

As the totality digital objects, also the augmented experience of the user is conceivable in the terms of a procedural process, operated at the level of user interface, which in turn produces results on a deeper level (this operation is very similar to that proposed by the situationist group in the invention of psychogeography computing in order to demystifies computing, turning it into a radically simple and popular low-tech and low-cost operation). This is precisely the organization of the spatiality of computational entities as well, that recalls the dualism hardware/software proposed by Manovich (2001) between deep spaces and surfaces. On one

plan, there is the surface structure, the place – typically it coincides with interfaces – that offers a view apparently similar to what we are used to seeing on paper, film and television; on the other one is located the deep structure: the level – consisting of hardware and software – where the digital information is processed and made perceptible to the human senses.

However, according with this broader understanding of augmented reality means conceiving the user practice in the space of the interface as determining the heuristic emergence of content produced through deep process itself. It is true both for augmented reality experience as well as for knowledge emersion in data-science field.

From a pragmatic point of view, the user's textual production is generally associated with the use of a software able to provide a range of "creative" tools through which the user can express himself. This process takes place at the interface level and at the same time identifies a deep and lower layer in which the data are processed. At the same time, it establishes a higher level, which corresponds to the storing and to the communication of the content created through the network. At this level, the content frees itself from the original context and acquires an independent existence, as the culture of the meme testifies. Thinking about data, the user process *leaves crumbs* (Pentland 2012). This process can be also detectable in the augmented reality experience. Here, the interface level corresponds to the image viewed by the user and it is always the result of a user's computational activity on the deeper level (carried out with the whole body and not only with interaction devices). From the visual standpoint, the image, that corresponds with the augmented field of view of the user, is constituted as an ever-new creation, independent of the previous one, created by means of a computational calculation on information both of the user and of the environment. But if we conceive augmented reality in the terms of data-science, the user experience itself becomes an image to look at (as evidenced by the emerging clickstream analysis practices). While the augmented user projects in augmented reality his/her data above the virtual environment, the data scientist is able to catch the information produced at the interface level and to traduce them in further navigable hypertexts.

5 Conclusions

The ambiguity of the augmented reality concept allows for some conclusions. By having outlined topologies and glimpsed how different social subjects assign different meanings to the information placed in spaces, it is clear that the phenomenon of cognitive increasing cannot be relegated just to the pervasive and playful experiences with which augmented reality technology is often associated. This is a phenomenon that not only affects the user or the prosumer, but also describes the *modus operandi* of those who *plan* augmented experiences and who read the data that these experiences produce, in an infinite cycle. In this perspective, the idea of "augmented intellect" (Engelbart 1962) is regained.

Therefore, to be at stake it is no more only the interactive storytelling, narratively based, enjoyed by the user who moves from a fragment to another fragment, by subjectively determining the flow of displayed events. The essence of augmented reality is instead that reality is essentially "read" by someone, and that this reading process occurs narratively. It is not just the user who read a story (his/her own story displayed on the screen), but it is the algorithmic engine that reads the user's story in a linear way, according with narrative pattern of artificial intelligence (the same at the basis of deductive ranking algorithms).

In conclusion, it is very interesting to note that the affirmation of the augmented reality trend has evolved hand in hand with that of narrating one's existence through the representation of oneself on social networks (and with a necessary patterning of the "personalities" by artificial intelligence algorithms). The main feature of the digital media user is that he/she is endowed (or in any case "expected" in this way by the platform) with a capacity and freedom of movement which corresponds to a general *form of life*, featured by the constant rational search for the satisfaction of a cognitive curiosity and by a more irrational tension towards the ontological dimension of the virtual, following the dualism among the rationalism augmentation and the irrational enchantment typical of augmented reality.

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Federico Biggio is a Ph.D. candidate in Semiotics and Media at the Department of Excellence of Philosophy and Educational Sciences of the University of Turin and at the Hypermedia Department of the University of Paris 8 Vincennes-Saint-Denis. His research areas concern the cultures of digital media, in particular those related to the augmented and virtual reality media. Moreover, he is interested in the digital humanities and in the analysis of computational techniques in cultural and academic field. After film studies, in 2016 he graduated in Communication and Media Culture with a thesis on augmented reality and wearable technologies and he obtained an annual research grant at the Interdepartmental Department of Territory Sciences at the Polytechnic of Turin. Among his publications, *The paradigm of augmentation. Immediate interactivity and cooperative design* (2016), *Digital arts and humanities for cultural heritage* (2018), *Augmented consciousness: Artificial gazes fifty years after Gene Youngblood's Expanded Cinema* (2020).

What makes an image?

Inscriptions, digital spaces and forms

In the current digital age, the image remains the fundamental medium through which we build our social, cultural, economic, and political interactions. Within this context, we believe that emerging approaches to the study and analysis of images require a fresh perspective that takes into account interdisciplinary methods. In order to bring together different disciplines and to question what making an image entails in the digital age, we organized the international symposium "What makes an image? Inscriptions, digital spaces and forms" that was held on February 28, 2020, at the recently inaugurated Maison de la recherche, Université Paris 8 Vincennes-Saint-Denis. This volume brings together the contributions of our international symposium, offering an extended and revised version of the talks. It is thus enriched with the input of our passionate debates, as all the texts were written after the event.

EDITED BY
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Faire image

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À l'ère du numérique, l'image est le support prépondérant grâce auquel nous construisons nos interactions sociales, culturelles, économiques et politiques. Les approches émergentes de l'étude et de l'analyse des images nous semblent donc appeler un regard neuf, basé sur des croisements interdisciplinaires. Afin de tisser des liens entre différentes disciplines et d'interroger ce qui fait image à l'ère du numérique, nous avons organisé un symposium international « Faire image : inscriptions, espaces et formes numériques » le 28 février 2020 à la Maison de la recherche de l'Université Paris 8 Vincennes-Saint-Denis. Ce volume réunit des contributions issues du colloque international, et propose une version révisée et approfondie des communications. Il s'enrichit également de l'apport de nos débats passionnés, tous les textes ayant été rédigés après l'événement.

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