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Guidebook for Mirror Worlds. Poetics of Transparency in Augmented Reality

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Transparency is a key concept in media theories on digital technologies. It denotes the feature of an interface that is able to *erase itself* (in the sense of 'interface-less'), making the user experience more immediate. In augmented reality technologies, for instance, transparency is distinctive of an interface that simultaneously displays virtual elements and real perceptions enabling a increased perception toward other surreal worlds, and at the same time, it is a mirror technology, since it enables a fundamental subjective and embodied dimension of the mediatic experience.

The aesthetic transparency of an augmented reality interface could denote a complete domestication of virtual objects (buttons, indicators, dynamic texts etc) directly in the field of view, but nonetheless it is possible to detect a cognitive transparency, by denoting the idea of a 'metaphor that guides thinking and reveal the staging mechanism' (Fuller 2017) going to focus on the perceptive and cognitive concession to the user as well on the opportunity to manipulate data directly and consistently, such are the applications in technics and medical field. Since they give access to this knowledge, these technological companies legitimise themselves and charged with value of accountability and social inclusion.

The contribution will bring as references forms of augmented reality texts referable to hacktivist culture, understandable as a complainant operation through subversive practices, often produced by artist and hacktivist and aim to affirm a sort of 'black transparency'. Nonetheless, augmented reality will be figured out as a technology for the emergence of virtual data from the physicality of reality, in terms of a situated knowledge, and this is the case of the cognitive transparency.

The doubleness of technology – that correspond to a doubleness of applications, with the technological enhancement on one hand, and the technological scepticism about the other – will be related finally to the concept of mirror – as the apotheosis of opacity – trying to understand a cultural configuration of the transparency.

Introduction

Nowadays emerging media like augmented and virtual reality can be described as *transparent* technologies. The article aims to deal with this concept (evidently not proper to digital media context) in order to figure out some technical features (and thus some social meanings) that contemporary digital cultures associates to these two emerging technologies and to devices components that support them.

The concept of transparency can be originally referred to a feature of a matter of the sensory world – from an aesthetic standpoint – but also to a cultural and ideological value. On one hand, it represents a propriety of a material that is able to let the light pass through it; on the other hand, a resulting situation achieved by an entity by offering to its observer some meaningful information about its operating, that is by making *transparent* the obstacle among the viewer and the view.

In the course of the article, we will recover some contribute addressed both in the semiotics field (Fontanille 2015) and in software studies (Fuller 2017), in order to figure out to what extent an emerging technology like augmented reality is nowadays building its cultural lexicon and is going to open a sort of *haptic turn* in the design of emerging wearable digital media, by proposing user experiences whose forms of contents as well as of the application's ideology are interpretable by dealing with the concept of transparency in different ways.

Starting from this perspective, we will notice that the main feature of augmented reality applications is the procedural process of *establishment* of transparency (it can be perceptive, cognitive), a process of achieving it through an increase of information (textual, visual, audio) as the result of a process of 'augmentation'. This process is possible thanks to the networking of a meaningful relation between the user of an AR application and the subject represented by the application (a company, an hacker, another user which has designed the application) that is established and played.

Let's start from the media theories. By recovering the inheritance of media theorists Bolter and Gromala, in *Windows and mirrors* (2003), the concept of transparency is conceived as the feature of a medium that is able to erase its interface, by allowing the user to 'see through' the interface of the device in which a content is displayed:

> When we watch a film, we can sometimes get so absorbed in the story that we may temporarily forget about everything else, even that we are watching a film at all. The film as an interface has become transparent for us (p. 27).

However:

> As producers, we must master techniques to render digital media transparent to the user, but we must also render the media visible to and reflective of the user. Every digital artifact oscillates between being transparent and reflective (p. 6).

Transparency is, conceived in this terms, a means to achieve the *immediacy* of medial experiences, featured by a form of apperception that occurs when a series of cultural practices of human-computer interaction became habitual and, in a certain sense, 'invisible' to the user. Moreover in early *Remediation* (Bolter and Grusin 1999) the concept of transparency was linked to the graphics techniques as the linear perspective, since it allows a more truthful representation of the real and thus can be understood as a transparency of interface that in the traditional arts lies in the frame. But while digital media like cinema or virtual reality tries to totally cancel the frame, by enhancing a vision that match exactly with the field of view of the user, augmented reality operates through the display of a frame (both that of an hand-held device, of a wearable digital screen and of an hologrammatic one) within the field of view, in which are inserted meaningful and virtual contents. The former enable an intensive movement in a virtual-other world whose awareness of the representation is reversed. The latter enable instead an extensive movement toward a mirror-word, by setting a distant view which allows to view simultaneously both the real world and its graphical increasing. This multi-focality is regulated by a relation of semantic relevance (as the meta-explanation of the real world).

These ideas for 'understanding media' will help us to focus on the very complex concept of transparency and on the different meanings that it may denote.

Two understandings of transparency

By overcoming the statement proposed by Bolter and Gromala, a fitting definition of transparency for augmented reality technology can be that of a strategy 'to reveal

the staging mechanism' (Fuller 2017). It means that augmented reality transforms the digital device in a tool for showing the 'means by which the activation of an understanding of a function is arrived at'. In augmented reality applications, the process of revealing the mechanism, for instance, can be detected in technical implementations for surgery or electrician tasks in which the device shows what is invisible from the surface, like the internal organs of a body or the technological infrastructure of a city underground. It makes transparent the layer of material – i.e. the obstacle – to the sight of the observer. In the same way, Boing researchers Caudell and Mizell in 1992 developed the first application in augmented reality for pilots which allows them to see the reality through an head-set above which are displayed virtual contents; the technicians enjoyed a mediatic experience by means of them, by seeing what is not physically present in the field of view. However, although both of them lie on a transparent device (the wearable digital screen in front of the eye), from the content standpoint, this early device didn't make transparent a surface, by showing what is posited below it, but increased 'the worker's visual field of view with useful and dynamically changing information' (Caudell & Mizell 1992 p. 660). Therefore, the former represents a transparency of the physical matter, an aesthetic one, the latter a transparency of information, a cognitive one that allows to the user to increase his meta-knowledge about a thing.

If we take a look to the semiotic configuration of the transparency, we can however detect a continuity. According to Jacques Fontanille (2015), the main operation scheme of transparency provides for an obstacle – that in sensory world is represented by the surface through which light is transmitted – and which, in a situation of transparency, is denied: transparency, in these terms, is a configuration based on concessive preaching. As we saw before, not all of augmented reality applications are accompanied by a transparency in this last terms. Nonetheless, both of them lie on the concession of some meaningful content, both a visual knowledge (as in the surgery application) and a meta-text about the physical world (like the instruction for manufacturers). We could state that one of the key to understand augmented reality as a transparent technology is exactly the augmentation itself that provides meaningful information wherever there aren't.

On the other hand, these emerging applications are still inscribed in a sort of 'magic aura' of enhancement related to the disrupting of emerging technologies. When we think about augmented reality of Pokémon Go, for instance, it's clear that there isn't a really increase of knowledge (like that of an augmented object, for instance). However also in this case, a concession is detectable: by means of specific device or application, the user became able to increase his own perception of the world, by making it inhabited of pretty fantastic animals.

The link between the transparency of surfaces and the enhancement, understood as a predominant irrationality in the user experience was yet described by Bolter and Grusin (1999):

> It is important to note that the logic of transparent immediacy does not necessarily commit the viewer to an utterly naive or magical conviction that the representation is the same thing as what it represents. Immediacy is our name for a family of beliefs and practices that express themselves differently at various times among various groups, and our quick survey cannot do justice to this variety (p. 30).

They thought about a more addictive learning experience, like in applications of edu-tainment for children; they fostered a future of technology in which real world and virtual contents are merged in the same environment and they promised greater immersion in storytelling worlds, like in Alternate Reality Games – in which fantasy and imaginary characters' lives in real spaces near to the users. This is also the necessary condition for the spatial augmented reality paradigm (Raskar 1998), in which 'the user's physical environment is augmented with images that are integrated directly in the user's environment, not simply in their visual field'. Here, the transparency is that of the threshold between the fantastic and the ordinary world.

In summary, by looking at the different applications of augmented reality, we could detect at least two fundamental forms of transparency, that however doesn't exclude reciprocally, and that are both lied on a concessive preaching. On one hand, a *transparency of interfaces*, that concerns mainly the natural perception of real things,

the virtual contents and the aesthetic experience that makes graphically transparent the physical world. On the other one, a *transparency of operations*, that is a means to reveal the operation, a discursive strategy (a social, cultural, technological one) to increase knowledge about the world enabling a cognitive pleasure given by the emergence of meaningful contents in the field of view, that operates by enabling a sense of enchantment linked with the use of new digital technologies. It is a shift to achieve transparency in a cognitive way.

Opacity and transparency critique

Although this issues witness of a predominant visual and aesthetical potential of the new digital technologies, there are several texts which promote critical thinking on augmented reality technology, dealing with the issue of the 'opacity' of aesthetic experience. In the short film *Hyper-Relity* (Matsuda 2016, http://hyper-reality.co), the user is alienated, flooded by pop-up windows and interactive elements displayed in the field of view. The visual design of this documentary is far from to represent a transparent experience of the augmented world: the unknown protagonist doesn't 'see through' the interface, he sees only the augmented world (and it's shown very well in the super-market scene in which, for a while, the device turns off showing a grey world disseminate by QR-code). The contents are transparent in so far as they display a huge amount of ordinated information about the operation of the surrounding world, which anyway remains hardly achievable by the user.

Nonetheless, there are also several experimental applications that work really as synesthetic enhancers: for instance, the application *orCam* (https://www.orcam. com) allows to blind people to experience the world (a synesthetic translation of it) by listening an audio description in real time of what is present in the field of view. By means of these applications, high-tech companies are self-outlined as utterers of a message of universal accessibility to the knowledge of the world, by providing the means by which it is possible to decline the obstacles of opacity (in this case of the blindness) – while, returning to opaque experience in *Hyper-reality*, technological companies embody a unwillingness to remove an obstacle, and this is could be translated in a dystopian distrust of the user with regard to the company.

For these reasons, augmented reality technology is continuously perceived in the cultural imaginary both as an enhancer for senses (transparency of interfaces), in an aesthetic way, by providing sort of x-ray vision that permits to the user to 'see through' the surfaces or to display something that doesn't exist yet, and simultaneously as an enabler of a 'mirror-world' – such it is called by the magazine Wired in 2018 – by representing a technology that aims to create a personalised perception of the world, above which only the user's data are displayed, a subjective and thus *biased* representation.

This idea of transparency is at the opposite of that has been explained above: the mirror is the apotheosis of opacity, it represents the absolute non-transparency of surfaces. According to Bolter and Gromala (2003), 'when we look in a mirror, we see ourselves, and we see the room behind and around us – that is, ourselves in context'. In their idea, 'digital interfaces are like mirrors in the sense that they reflect the user in context, including her physical surroundings, her immediate working or home environment, and the larger environment defined by her language and culture'. Likewise, augmented reality represents a perfect instance of a medial experience of the post-medial condition in which the fruition of contents is totally individualised in the 'first-person shot' (Eugeni 2018), that is the fundamental figure of medial experience in videogame. Here, the mirror is nonetheless a tools able to display what is invisible by the subjective perspective of the reality, something that help to show the operating of what is in front of it.

In this perspective, the metaphor of the mirror became useful to understand the ways in which the contents are addressed to the user view: wearing a digital screen, he sees himself and his environment represented within the interface. The real world is not augmented with sharing contents but through a calculation of his personal data. For instance, Google Glasses recognise a face only if the software device is linked to the Facebook account of the user's friends, and it is able to provide suggestions and advices according to this data, like in a first-person videogame. Referring to these phenomena, the aesthetic philosopher Pietro Montani (2014) wrote about a risk of a 'numbing experience' in which the grasps of the senses are

anticipated and the world is displayed under a *single profile*, that is the result of a political choice or of a cultural and social convention – again it is detectable a risk of opacity.

These are probably the same ideologies that had led to the production of several augmented reality artworks with different critical purposes. This is the case of Occupy Wall Street, the protest movement born in NY in 2011 against the abuses of financial capitalism, and the artwork in augmented reality by Mark Skwarek. We find auras of the face of Washington applied to that of the protesters, virtual layers of them in places where it was forbidden event and, in particular, of the facade of the New York Stock Exchange augmented with the aura of the display of a slot machine – here the reference between the economy politics and the gambling is clearly a metaphor, an interpretation, which through augmented reality became aesthetically available.

Other instead hadn't subversive objective, like *Proxy 5-WM2A* by Will Pappenheimer (2014), a performance commissioned for the 2014 Whitney Gala, in which augmented reality was imagined as a pill able to enable an hallucinatory experience, necessary to see the artworks and refresh the museum experience.

Both exploit the potentiality of digital technologies by re-writing the real on the virtuality level, and often its contents are referred to unknown truth which the augmentation make visible.

Occupy Wall Street AR can be related to the category of 'black transparency' (the expression is taken from the essay *Black Transparency: The Right to Know in the Age of Mass Surveillance* by Metahaven) and expresses the user's request for more transparency in terms of accessibility to information and knowledge in democracy systems. However, as well as in ARG, they not provide a real increase of knowledge in contents, as in traditional AR application. Rather they represent an artistic interpretation of the lack of it, a metaphor (again a meta-representation, something that is more near to the mirror rather than the transparency of layers).

Thus how does the process of emerging knowledge works in augmented reality environments in order to understand it as a process of achieving transparency? It could be limited and related to specific knowledge about a task, subjective and

referred to the personal data of a user or 'black', in which what is important is the discursive process implicit in the augmentation process.

All above examples could be therefore understand as a metaphor to overcome the opacity of the world, both of what is unseen and what is willingly hidden. Following Fuller (2017), transparency is defined also as a 'metaphor that guide the thinking'. In this last understanding – and following the mode of operating of the metaphor which moves from a principle of abstraction to understand a particularity – augmented reality operate by means of the reversal of the principle of abstraction, moving down from generality to particularity. Through this process it is produced a cognitive pleasure typical of disclosure and discovery: according to pixel semiotics of Massimo Leone (2018), a cognitive pleasure emerge every time that they could 'look closer and better, in order to distinguish the traces of a predator in the sand, for instance, or the eyes of an enemy in a bush'. In the same way, a cognitive pleasure – but also aesthetic, related to the enhancement of emerging technologies – emerge when a virtual layer of the constellation in the sky or the tube map under the roads of a city is displayed on the screen of a digital device, or more, every time that a Pokémon is discovered, as in Pokémon Go, or a fragment of a story is reached, as in Ingress.

Data-visualization: transparency as reflectivity

To understand better this model it could be useful to think about the process of data harvesting, prior to every operation on Big Data, oriented to the production of data-visualisation hypertexts. The idea of 'harvesting' recalls yet to an arrangement of indistinctiveness of data produced by different forms of digital practices and nonetheless to the detection of objective information about a phenomenon, by pursuing again an ideology of transparency of knowledge.

The harvester manipulates the discontinuity of the data flows in order to extract from it the cluster he needs to understand a phenomena, like the discovery of traces in the sand is oriented to understand what is happen in that place. Through the harvesting process, an amount quantity of data is extracted by database and organised in clusters and functions, in order to give a meaningful reading of a

process. In this sense, media hacktivist Salvatore Iaconesi and Oriana Persico in *Digital urban acupuncture* (2017) had proposed the idea of the 'Third Infoscape', a virtual level, laying above the bureaucratic and administrative one, where the information and knowledge generated through personal devices of users gets left behind, through the progressive sedimentation onto the city of the expressions of the daily lives of citizens. Some of their projects, like the Real Time Museum in Sao Paulo deals the theme of transparency of data, in terms of accessibility, and consist in the collective production visual and concrete representation of these complexities and dynamic processes that is possible to understand as a form of 'actualisation' of the information which lay in the virtuality of the Third Infoscape, similar to the computational operation of machine vision operated through augmented reality devices. These representations constitute a sort of transparent layer posited above the real in order to better understand it. From an aesthetic standpoint, it is the same of augmented reality situation in which a user manipulates simultaneously real and virtual entity by exploiting of a distant and comprehensive gaze.

Again the transparency of augmented reality (conceived as a paradigmatic practice rather than as a specific technology) can be related not only to a 'make accessible' operation, oriented to the emergence of a set of information, but to the production of a meaningful text (often a data-visualization) whose interactivity represents the feature through which a user can built his own medial experience, his own data-representation of the world.

Concluding, it is possible to gain the metaphor of the mirror by recalling the strategy of reflectivity proposed by Bolter and Gromala (2003). The specific feature of these interactive representations, indeed, dwells again in its explicative potentiality, able to make visible relations and dynamics invisible with a naked eye, like the contents see through below a transparent surface. These make readable, for instance, complex and amorphous information about a community, proposing a geographical, statistical, artistical image in which that same community can re-discover itself, like in a mirror. After all, this the main feature of the mirror. We mirror ourselves to control our look and to adjust our hairstyle, to see what, naturally, is impossible for us to see but that is necessary to acquire an awareness of our condition.

Nothing new, our culture is disseminated by narration in which there are non-reflective mirrors that are, in some way, also transparent, because they represent access doors for fantasy worlds as in Alice in Wonderland, or the one of the Evil Queen, and so on. Often these are habited by fictional and imaginary characters which have the power to refer a truth, to make aware of a particular situation or to help the protagonist in his personal path of growing in different ways. In a certain sense, also augmented reality technology could be better understand through the metaphor of a mirror that reveals truths about the subject that is mirrored.

Competing Interests

The author has no competing interests to declare.

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