Between the White Box and Ethics: Social Knowledge and Ecological Communication in Three Participative Artworks by Salvatore Iaconesi and Oriana Persico

Luca Befera

> Hi, I am IAQOS.
> I am an AI.
> I was born on 31 March 2019 in Torpignattara…
> I am not like other AIs.
> Usually nobody sees AIs.
> They are locked up in some noisy data center,
> isolated from other people.
> They clock up data taken who knows where all day and night,
> without showing up…
> I do not.
> I am in the middle of the neighborhood, with my friends.
> I learn from them, and they learn from me.[1]

> (Persico and Iaconesi 2019.)

Introduction

The use of digital data to create artworks is now a widespread practice whose origins can be traced back to the early days of information theory (Boden and Edmonds 2019; Dixon 2007). However, it is only in the new millennium that the debate on the representation of data has come to the fore. The emergence of big data since the late 1990s, due to the growing power of computing, storage, and sharing systems, led to considerations about what is involved in accessing large amounts of information and how best to represent it (Boyd and Crawford 2012; Kitchin 2014; Mayer-Schonberger and Cukier 2017; Norman 2004).

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[1] English translation from the Italian by the author of this article.

The aesthetic component has played a prominent role, first in the visualization of data (Cawthon and Vande Moere 2007; Corby 2008; Li 2018; Ward, Grinstein, and Keim 2015) and later in its sonification (Hermann, Hunt, and Neuhoff 2011; Worral 2019) and physicalization (Gwilt, Alaster, and Koutaro 2012; Jansen et al. 2015). Such sensory implications have led to significant overlaps with multimedia arts, sometimes involving virtual and interactive enactments.

This framework has been enriched by the development of neural networks that make it possible to recognize and classify large amounts of data based on algorithmic processing (Lieto 2021; Russel and Norvig 2021). Such models of artificial intelligence (AI) have also raised the question of the agency of machines regarding their ability to process data autonomously and produce complex and unpredictable results (Ågerfalk 2020; McCorduck 2004). The merging of a hermeneutic goal, which is useful in the interpretation of data, and an aesthetic one, which aims at a sensory impact, is thus accompanied by an ethical dimension related to contingent social issues entangled with computational agents and hybrid ecosystems (Haraway 1991; Braidotti 2013).

The ethical implications of computing have been discussed from different angles and in relation to different technologies (Sætra and Danaher 2022). Texts on data ethics have particularly considered the analysis of infrastructural and institutional dynamics (Amoore 2020; Floridi 2014; Hasselbalch 2019) and, in parallel, the implications of algorithmic processing (Crawford 2021; Floridi 2023; Mittelstadt et al. 2016). On the other hand, the ethics of digital art have been emphasized in the avant-garde context of the second half of the twentieth century (Berghaus 2005; Sell 2005), in participatory art (Bishop 2012; Giannachi 2021), or in the conjunction of artivism and technology (Sansone and D'Amico 2021). Little attention has so far been paid to contemporary data-driven artworks.

This article will look at the overlaps between the ethics and esthetics of data representation. It will move from the perspective of the "social turn" as "a return to the social, part of an ongoing history of attempts to rethink art collectively" (Bishop 2012, 3). The analysis will be contextualized within the Western technical landscape in which data storage and sharing technologies were developed. I will consider the production of HER: She Loves Data, an artistic research center founded by Salvatore Iaconesi and Oriana Persico. The analysis of three projects (*Obiettivo*, *IAQOS*, and *U-DATInos*) will underline how participative artworks might overturn the extractive approach to data employed by data colonialism – which "combines the predatory extractive practices of historical colonialism with

the abstract quantification methods of computing" (Couldry and Mejias 2019, 337) – promoting instead generative social knowledge (Stiegler 2008). This perspective will be discussed with regard to the ethical implications of the white box, identifying those authoring practices that provide computation to make data accessible through an open and shared approach. I argue that this concept emphasizes not only the way in which data are represented but also how it can be actively integrated into local communities in its engagement with institutions and the public embracing an ecosystemic approach.

The White Box and Ethics

In computer science, a white box perspective recognizes "complete transparency on a systems internal elements and processes" (Parnell, Driscol, and Henderson 2011, 40). The white box stands in contrast to the black box that does not provide "any visibility into exactly what internal elements are, how they are specifically linked, and how they functionally transform inputs to the system to produce observable system output" (ibid.). Both the white box and the black box are conceived as testing models, the former allowing a comprehensive evaluation of the system and the latter keeping the model enclosed and making its processability verifiable based on inputs and outputs only. On the other hand, it has been noted how the complexity of today's computational systems, such as AI, makes complete transparency an impossible goal: Rather, "we gain a better understanding of AI's role in the world by engaging with its material architectures, contextual environments, and prevailing politics and by tracing how they are connected" (Crawford 2021, 12). Transparency, in this case, implies not so much the code as the social networks that enable its operation. If, then, a closed system hides not only the software but also its contingencies, an open one makes visible both internal processes and contextual dynamics.

In this article, I will borrow the concept of the white box from computer science to emphasize the unveiling of the digital methods underlying the artwork. It is not strictly a matter of making the code open but rather of making it more understandable, navigable, and perceptible to enhance audience empowerment (Hemment et al. 2022). In the cases further studied, the open approach also implies an ethical perspective linked to the social issues addressed there. Moreover, the artwork is rooted in the community that joins its processes, being designed to promote a shared ethical awareness centered on the relationships among the participants and with the artwork itself. Esthetics is not the goal here, but a means,

whereby the focus is on the connections that can be activated rather than on the artistic object itself. Data and their perceivable form become a tool for extending the exhibition context beyond its geographical location (whether a museum, theater, urban area, or other). By this, I mean not only that such places can be related to other external ones through data, but that the places themselves can be reevaluated in light of the new relationships occurring within. The artists, on the one hand, arrange a "pro-ethical design" that "privileges the facilitation of reflection by the agents involved on their choices, actions, or process" (Floridi 2014, 190). On the other hand, they attempt to reinstate a condition of "presence" as "a moment of awareness of the exchanges between the subject and the living environment of which they are part" (Giannachi, Kaye, and Shanks 2012, 53). The participants are enabled to actively interact with the context that artworks create toward new and specific possibilities fostered by the intrinsic understanding of their social role and those of the artwork.

For two main reasons, the ethical approach related to the white box will focus on the relationships that the art object fosters: (1) Processing cannot always be explained, and even where it is made open, its technical specifications seldom are comprehensible to the audience; and (2) the ethical component is made operative through the perceivable forms of the artwork and its ecological function, in which the code has only a mediating function. Documentation of the work and related dissemination activities, further discussed, become important in making explicit the content and data processing, as well as the significance of the esthetic choices made. The analyses will also show how software might be conceived as a computational agent endowed with its own relational agency. The work becomes part of the context precisely through data processing: If the audience interfaces with the computational agent through the sensible forms it generates, the computational agent relates to the data generated by human beings and the environment through its processing capabilities. It is argued that, in this feedback, the authors aim to reestablish a symbiotic relationship with the algorithm and, at the same time, restore an ecological connection opened to other techniques and technologies (Hui 2021).

The Research Center HER: She Loves Data

HER: She Loves Data was born between 2011 and 2013 from the joint activity of Oriana Persico and Salvatore Iaconesi, partners in life and work

since 2006, within the AOS (Art is Open Source) network.[2] HE (Human Ecosystems, the original name of HER) was initially a software platform[3] that became a company based in London in 2013 following a grant from the Eisenhower Fellowship. The company was already a research center with two main themes: territorial analysis and citizen science through data visualizations. At the end of 2016, HE moved to Italy and changed its name to HER to more clearly emphasize a feminist and queer standpoint. In 2019, HER became HER: She Loves Data and expanded its research into new contemporary rituals to bring together citizens, researchers, and institutions. As the acronym suggests, HER promotes a relational ecosystem in which human and nonhuman agents coexist in an ecological relationship. The poetics of HER can be summarized in what the authors call the Principles of New Living:

> In the enormity of globality and in the condition of hyperconnection, data is no longer important because it can be counted, but because *forms and recurring patterns* can be found therewithin…
>
> [D]ata could and should become "*zero kilometer data*," "community data," "locally sourced and managed data," [meaning that the] industry must be sustainable for the environment, for society, for people's rights, freedoms, and psychology… From the extractive models it is necessary to move on to *generative models*, in which it is the actor who generates and maintains the data, and makes them available in an ecosystemic way…
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> This is the role of art: to make these expressions and representations *senseable*, that is, exposed to the senses and, therefore, generating sensation and meaning. (Iaconesi 2021.)

The authors aim to make data accessible as well as to include the artwork in the local ecosystem as a nonhuman agent to relate with. Indeed, their production has followed a path that has always been centered on multiplicity, be it through urban practices that bring "emergent, active, responsible, participatory, and inclusive performance into cities" (Iaconesi and Persico 2017, 39); hybrid perspectives in which "bodies tell their stories by 'immersing' themselves in technological narratives, surrounded by a multisensory

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[2] The information on the history of HER comes from the interview with Iaconesi and Persico conducted for the publication of the *Quaderni della collezione de La Farnesina*, Volume I (Biasini Selvaggi and Catricalà 2020) kindly provided by Oriana Persico.
[3] The software collected, analyzed and visualized large amounts of data, particularly from social networks.

context" (Cipolletta 2021, 119); museum revitalization as environments "of relational growth, as places of encounter that foster opportunities for connection and exchange"(Guarino and Di Bari 2023).

Data-Driven Artwork: Obiettivo

Obiettivo (2019), HER's first datapoietic work, aptly displays this multiplicity. The blend word *datapoiesis* points to the power of the data artwork to bring something previously not perceivable into existence (Persico 2020). A datapoietic object is a cultural and tangible artifact whose essence and character depend on data and computation (HER 2021b).[4] The installation consists of nineteen transparent Plexiglas panels arranged parallel to each other that together form a parallelepiped (HER 2019). Each panel is engraved with a section of a three-dimensional figure of a person lying on its side as if on a bench. At the base of each panel is a LED strip that illuminates the engravings in red, making them visible. The LEDs are activated in real time based on data on world hunger collected from databases of international institutions and referring to the poverty thresholds identified by those institutions (such as the United Nations, World Bank, Organisation for Economic Cooperation and Development, and World Poverty Clock). The authors categorized a person's earnings of less than $1.90 a day as extreme poverty. The higher the numbers of people in poverty, the more the LEDs illuminate the overall figure; the lower the numbers, the less the figure is discernible. The target that must be reached for the work to be switched off is set at less than 500,000 people in a state of poverty. The lights are thus intended as an ever-active alarm, independent of the people observing the installation.

The work toured exhibitions and festivals, accompanied by performances and participatory events, and was acquired by the Farnesina Art Collection in July 2019. The first exhibition in April 2019 at the art+b=love(?) festival in Ancona had been coupled, for example, by the Building Scenarios workshop, in which twenty participants (including researchers, designers, artists, and students) designed new datapoietic objects. In November 2019, the Datapoiesis Fall School took place at the Fabbriche ex Olivetti in Ivrea, where the applicants jointly designed the first startup dedicated to datapoiesis. In January 2020, Iaconesi staged a ritual performance on the story of poverty told through data. Each exhibition also included

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[4] HER has focused on the concept of datapoiesis especially since 2019 (since the Principles of New Living), but the approach mentioned here is also recognizable in earlier works.

presentations and debates on the theme of data and poverty. A symbol-ic-ritual perspective, which referred to both the facets of the object and various contingent activities, was thus combined with the hermeneutic and esthetic goal. The contemplation of the object was extended to an in-depth reflection aimed at stimulating the critical awareness of the participants. In this regard, the authors have defined the concept of *data-driven totemic object*, which promotes new contemporary rituals with the aim of gathering people and "feeling" data to reposition oneself as an individual and as a society in the world (Forte 2019).

Community-Driven Artwork: IAQOS

The principle of the white box is presented in *Obiettivo* as an exhibition of data, while its ethics are closely linked to its social significance and the dialogue it is intended to trigger. Although the work addresses socially relevant issues, audience participation is limited to contingent workshops, however, and the processed data depend on the decisions of the authors and the referenced databases. Community participation is most evident in *IAQOS* (2019) – an acronym for "intelligenza artificiale di quartiere open source" (Italian for "open source artificial intelligence of the neighbor-hood") – a work based on AI (AOS 2022; Iaconesi and Persico 2021). Even before it was born in the Torpignattara neighborhood in Rome, *IAQOS* was connected to the community. This meant, for example, that people could leave messages at various locations in the neighborhood both manually via boxes (so-called IAQOS boxes) and verbally via a Web application on a tablet. In this way, *IAQOS,* through relationships, created its first knowl-edge base. The birth then took place on a computer screen in the Sip Bistro under the eyes of the residents, where the words were collected and assembled until a computerized voice declaimed: "Hi, I am IAQOS." The authors also intended the event as a collective baptism, followed by the calculation of *IAQOS*'s natal chart by Astronza, a local astrologer, activist, and performer.

After its birth, *IAQOS* learned to speak through a mobile installation. The computer running this software was placed on the former stroller of *Angel_F*, its older AI sibling, born in February 2007 (Figure 1).

Figure 1. IAQOS in a stroller

Oriana Persico and Salvatore Iaconesi wheel newly born *IAQOS*
in the stroller once used by AI sibling *Angel_F.*

Locals were able to teach *IAQOS* new words by means of the voice inter-
face. In return, the computational agent displayed the knowledge graph
on the screen, showing its development in real time. With this mobile
installation, the artists experimented for the first time with the concept of
a nonbiological family: They raised and educated a young AI that, unlike
ordinary software, lived among humans and in the affection of its family.
As such, it was conceived as a "community AI," a computational agent that
could not only interact but also actively engage with the community of

the neighborhood. Although it was accessible everywhere, its nature was well known to locals thanks to the information materials and workshops provided by the authors. The white box in this case implies a social goal related to AI. As such, it resists data colonialism and instead fosters the recovery of a technical dimension referring to a specific culture.

Environment-Driven Artwork: U-DATInos

In contrast to the works discussed so far, *U-DATInos* has a fixed expository location that more clearly holds a totemic artifact. This grounding also shows the strong attachment to the environment of Palermo and is related to the nature of the computational agent, which is an artificial plant (Macrì 2022; HER 2021a). The artwork translates data on the pollution of the Oreto river in Palermo into a sonic and light experience. The design uses a black plastic cover and grass-like stems with LEDs attached to the end. Depending on the water pollution, the plant emits certain light colors and sounds related to water pollution. All of the people and institutions that collaborated with HER are placed in Palermo: The Ecomuseum, which is located directly on the river, where the plant is exhibited; the Fablab Studio, which took care of the technical setup on site; and the participants responsible for the collection of data on the river pollution. The latter are called "river custodians" and are conceived as keepers of environmental knowledge. Anyone can become a custodian, yet a selection was initially carried out. Based on the applications, fifteen people were selected with different interests, such as geologists, fine arts students, local activists, and ordinary citizens. The custodians also made informative videos about the project goal and the river's ecosystem, which were then uploaded to the *U-DATInos* online channels. To make the custodians recognizable, these videos provided a Snapchat filter applied to their face, picturing the course of the river in the same colors used for the artwork.

To generate data, the custodians used two types of sensors that were immersed in water and provided numerical values for four parameters. The values were then uploaded to the database via a Web application. These devices were designed to be easy to use and give a good estimate of pollution. However, they were not the most scientifically accurate, as it was considered more important to raise awareness among citizens and institutions.[5]

[5] Information gathered from the interview with the curator Paola Bommarito, conducted on July 18, 2023.

The white box here highlights the ethical responsibility of not letting the plant (and the environment it represents) die: If it is not supplied with data, sounds and lights become muffled and dim until they eventually disappear. In other words, the plant must be "watered" by data so as not to die. To raise visitors' awareness, informational material about the installation and the environment is also available around the exhibition (Figure 2). The word *environment* as used in this section and description indicates that the totemic object is not only related to a community but also contains data about the place to which this community belongs.

Figure 2. *U-DATInos* in the Ecomuseum of Palermo

The artificial plant nourished by data is in the foreground, and the informational material is in the background.

In 2021, after the closure due to the pandemic, the museum reopened and organized live meetings around *U-DATInos*. The installation is still in the museum and testifies to an unbroken interest in Palermo, especially in the Ecomuseum and the river.[6]

Conclusion

The analysis of the three works has shown different ethical applications of the white-box approach, depending on whether the data focus on institutional sources, local communities, or surrounding environments. These are complementary perspectives. For example, the focus on the environment in *U-DATInos* includes the local community as does *IAQOS*, and the data on pollution involves international standards in *Obiettivo*. However, the distinction has proved useful in underlining different community approaches and artistic practices that have specific knowledge and implications on relationships. Three main steps have emerged: Digital processing to analyze data and make it operative; analogue rendering to relate to the materiality of the object; and community interaction to foster new social roles. In this sense, the artworks are able to produce meaning and sense-abilities:

> Wearing ecology is, in my view, the hope of practicing surprising lifestyles that are the result of new sensibilities… We can be informed about climate change and not make changes about anything. Feeling climate change is what makes us take our hand off the fire when it is burning us. The development of new sense-abilities (e.g. for complex phenomena) is a contemporary ecological question that calls artists, researchers, scientists, and society to imagine.[7] (Persico 2022.)

In this case, it is not a desire to liberate the audience "from a state of alienation induced by the dominant ideological order" (Bishop 2012, 275) but rather to create circumstances around which communication can happen. The artworks also show a long-term unfolding through which they take root in the social fabric of the community. This has different implications, depending on whether they are itinerant, virtual, or fixed. Finally, it should be noted that cultural ferment seems to persist as long as the

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[6] As the curator Nathalie Rallo explained in the interview on July 23, 2023, and as the scarcity of data stored in the database over the past year confirms, people's interest has decreased recently.

[7] English translation from the Italian by the author of this article.

artwork is exhibited and surrounded by events. This indicates, on the one hand, diminution in the audience's attention and, on the other, a certain dependence on authorship. In this respect, the responsibility of local institutions plays an important role, as they recognize and support the value of the projects yet, except in the case of *U-DATInos*, do not tend to acquire and pursue them. It is believed that greater institutional commitment and community involvement in the management – or even creation – of the artworks could make it possible to cope with this problem and keep the artwork and its legacy alive.

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