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Aesthetic perspectives on interactive art and Text-to-Image technologies (TTI)

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Abstract. By reconstructing the connections between different artistic forms, such as *Art Sociologique*, cybernetic, media and digital art, the paper addresses how the concept of interactivity has evolved in relation to the development of aesthetic paradigms. Firstly, the paper problematizes the concept of interactive art, by discussing connections and differences with media and digital art. Secondly, the paper shows how Flusser's concept of participatory media, influenced by the artistic work of Fred Forest, together with the theoretical perspective developed by members of the Group for an Aesthetics of Communication, contributed to the development of new perspectives in interactive art. Thirdly, the paper shows how theoretical perspectives such as Relational aesthetics and the Aesthetics of Communication constituted the basis for the successive reflection on the potentialities of virtuality and immateriality from an artistic perspective. By drawing on such premises, the paper addresses the issue of the meta-operational processes involved in the use of Text-to-Image technologies (TTI), discussing the level of interactivity and the creative processes involved in its use. Finally, the paper problematizes the features of interactivity that characterize emerging forms of art made possible by virtual devices.

Keywords: Vilém Flusser, Fred Forest, art sociologique, aesthetics of communication, digital aesthetics, interactive art.

1. THE AESTHETICS OF INTERACTION FROM CYBERTENIC ART TO DIGITAL ART

The concept of interactive art, intended by Kwastek (Kwastek [2013]) as the hybridization between the visual arts and a variety of digital technologies, allows the viewer to engage with an interactive system developed by an artist or an art collective, and involves both subjective and objective factors.

The subjective factors involve processual and contingent aspects such as the users' social interactions and individual behaviors, the artists' intentions and their implementation, realized in collaboration with the programmers. The objective factors, instead, refer to the artifacts used by the artist, such as an interface equipped with

a technical apparatus and the relative programmed processes.

Kwastek argued that a perspective based on interaction aesthetics might provide a better understanding of media art by reducing its vagueness. The category of “media art”, which starting from the ’80 refers to artistic works that make use of electronic media, has been criticized by Rech (Rech [2002]), who noticed that all art is media art insofar as each form of art aims to express a message through a medium of some type.

Furthermore, Kwastek (Kwastek [2016]) underlined that even if we consider a narrower definition of interactive art, which only refers to artistic expressions that use electronic media, we risk failing to distinguish between participatory and representative works, as well as between analogue/digital images and sound production processes. However, the definition allows to highlight the aspects of technically focused and process-oriented creative forms that make their presentation in the framework of visual arts insignificant. The concept of interactive art differs as well from the category of “digital art” (Torre [2021]), which is generally understood to include installations and performative works incorporating digital technology and wholly immaterial works represented in code, software, or data. Furthermore, it is used to describe artistic projects where the processual aspects of digital technology are fundamental aspects of the work, as well as projects that predominantly use digital technology as part of their production technique.

On the contrary, “interactive art” is a term used to describe works of art that require the viewer to do an action beyond just cerebral receipt. Gendolla (Gendolla [2001]) argued that the term “interactive art” is used anytime generally interactive processes, which need not to be digitally mediated, are mentioned. The category of “interactive media art” refers to digitally mediated interactive artworks, where digital technology count as the main interface for aesthetic experience.

As Sakane (Sakane [2009]) noticed, the category of contemporary interactive art first appeared

when, in the 1960’s, thanks to computer science, it became possible for viewers to participate in the realm of the artwork actively. In that decade, computer technology had advanced to the point where real-time feedback interaction between humans and machines started to be feasible.

The capacity of artists to conceptually connect the scientific field of cybernetics with the aesthetic discourses was crucial to apply the cybernetic science to artistic problems.

Cybernetics, as Sage argued (Sage [2016]), is an epistemological subject primarily aiming at developing models of systems based on the information, feedback, and control properties, seeking to understand systems in a variety of media, such as social biological, organizational and technological. The term was introduced by Norbert Wiener in the 1948 book *Cybernetics*, which inaugurated a field of studies aimed at understanding communication processes and control practices. In its historical evolution, cybernetics turned from engineering to systemic constructivism’s influence on human cognition and social interaction. Heinz von Foerster, an Austrian-born physicist, examined how complex systems manage themselves toward a specific objective in facing challenges by using information, modelling, and regulating operations. As Raschke argued (Raschke [2022]), due to the phenomenological focus of his philosophical approach, von Foerster’s work sparked a vast critical interest in media-theoretical and artistic circles in the 1970s and early 1980s. In those years, in fact, several artists used cybernetics as a model for aesthetic investigation and as a paradigm for redefining the idea of art itself by drawing metaphorical connections between the two fields of study (Cfr. Sakane [2009]). Such a perspective emphasized the artistic process, as opposed to the product, and highlighted the environment or context as opposed to conventional subject matter or style, by putting art into motion, using the concept of feedback, and invoking interaction with the viewer.

These patterns assisted in creating a point of intersection between cybernetics, art, and aesthetics. For example, the new media artist Fred For-

est, co-founder of the *Art sociologique* and of the *Communication Aesthetic Group*, was among the first in France to use video and closed-circuit television in his art¹, and in 1970 created an audio-visual environment and presented it at the Universal Exhibition in Osaka.

2. PARTICIPATORY MEDIA AS DIALOGICAL STRUCTURES

In 1972, as part of his *Space-Media project*, Forest published on the columns of the Parisian newspaper *Le Monde* a little blank area, defined *150 cm² of Newspaper*, and readers were proposed to fill in the blanks with their own works of art, poetry, or criticism and submit them to Forest. It was a provocation aimed at reflecting on the authorship and public's participation in the artists' work. In the same year, Forest met the Czech philosopher Vilém Flusser, as they were both attendees of an art conference organized by René Berger.

In 1974, the artist chose Flusser as the subject of his video *Les gestes du professeur* (The Professor's Gestures), and the Czech philosopher wrote an essay dedicated to the French artist. In the essay, titled *Art sociologique: Dossier Fred Forest*, Flusser (Flusser [1977]) discussed *Space-Media*, which he viewed as Forest's most effective attempt at sociological art, including the above-mentioned artistic blank space in *Le Monde*, and stated that in his research, the artist expertly combined the principles of cybernetics (Flusser [1977]: 367). Furthermore, the Czech philosopher argued that the key to Foster's artistic actions is his idea of video as mirrors, an aspect related to an inter-subjective and post-objective epistemology. In Flusser's view, in fact, video is not considered only as a recording tool, but rather as a relevant epistemological instrument, since:

It has virtual properties which are absent in other media: it is an audio-visual and space-time continuum. It is involved in the phenomenon which it

shows. It can be immediately projected without having to be 'edited'. It is open to the dialogic process. It summarizes certain aspects of the printed word, and film; and the lecture (Flusser [1974]: 236).

In his view, video was a brand-new kind of mirror tool that was extremely useful from an epistemological perspective, as the epistemic advantage that mirrors may provide is directly dependent on our inventiveness in "manipulating" them, particularly by purposefully placing them so that they mirror each other, opening up recesses within recesses in endless regression. As a tool that creates an artificial separation between the world and ourselves, the mirror is seen by Flusser as the critical paradigm of the post objective epistemology, because it enables us to see the world from a different perspective. According to this epistemological perspective, "knowing" results by causing a vision in a mirror in which the subject and the object unexpectedly appear together, where videos function as mirror-devices that reveal the relationship between subject and object. In this perspective, moving images are not considered as mere mirrors of reality, but rather as tools that could contribute to new modes of relationality.

Also in 1974, Flusser participated to *Open Circuits: An International Conference on the Future of Television*, held at the Museum of Modern Art in New York, and presented the essay *Two Approaches to the Phenomenon, Television*, published in 1977 (Flusser [1977b]). Following a phenomenological approach, he argued that the impression of control over the video-projection enhanced an illusionary impression of participation, when in reality it fostered passive reception. At the same time, Flusser noted that, if used dialogically in open circuits, television could become «a medium for understanding the world and dialoguing with others» (Flusser [1977b]: 247).

As highlighted by Tooley (Tooley [2022]), the idea that videos could be used as tools to enhance a dialogical practice and to develop an "interrelational style" sets him apart from the post-structuralist perspective that prevailed in media theory in the 1970s and 1980s. For example, unlike Baudril-

¹ Martial Raysse produced the first video display in France two years earlier, in 1967.

lard – who was convinced that mass media had substituted reality with hollow simulacra and signs lacking any real referent (Baudrillard [1981]) – Flusser offered a less pessimistic interpretation of the images produced by technical devices. In his view, the moving images produced in videos, photographs and television screens had the potential to project new dialogical models and ideas into the visual domain. In our view, such a difference is also due to the fact that, unlike the French thinker, Flusser did not yearn for a “real” that had supposedly existed prior to technical reproduction, but rather considered reality to be increasingly modulated by technical images that inscribe concepts through connotative forms of signification.

From 1975 to 1976, at the Théâtre du Centre in Aix-en-Provence, Flusser delivered several lectures within a series of seminars titled *Les phénomènes de la communication* (The Phenomena of Communication). In the fifth lecture, titled *Du discours scientifique à la démagogie*, he criticized McLuhan’s famous metaphor of the global village. In contrast with the idea that the electronic communication technologies transformed the world into one interconnected village (McLuhan, Fiore [1968]), Flusser argued that «our society became a global amphitheater, a global circus, and not a global village, as McLuhan claims²» (Flusser [1976]). In Flusser’s view, in fact, the metaphor of the global village excluded the issue of the unidirectional communication that characterized mass media at the time. Instead, the Czech thinker – without concealing the possible deleterious consequences implied in the emergence of apparatus designed to create programmed information – interpreted video art as a challenge that could disclose unexpressed possibilities in terms of participatory media, holding out hope for agency and critical practice in the activity of media makers and users.

An example of such emerging possibilities is described in Flusser’s essay *Line and Surface*

² «Notre société est devenue un amphithéâtre cosmique, un cirque cosmique, et non un village cosmique comme le dit McLuhan» (our translation).

(Flusser [1973]). He argued that technical moving images, thanks to their dialogic virtualities, could combine the synchronous capacity of images with the linearity typical of texts «lifting the linear historical time of written lines onto the level of the surface» (Flusser [1973]: 101). In his view, the synthesis of surface media and linearity may inaugurate unprecedented types of thinking, characterized by a new kind of codified symbols that allow images to order concepts within visual structures, and concepts into images. The new video technologies, intended as moving images that allowed to merge conceptual and imaginative thinking, inaugurated the possibility to transform mass media’s unidirectional communication channels into dialogical structures.

In his view, unlike cinema and television – which can be edited and encourage passive reception – videos are able to provide real-time feedback through a monitor, therefore enhancing the dialogical and discursive dimension.

While television and cinema’s temporality is largely an optical illusion, video art made by the videographer is fundamentally temporal, since the people recorded are not just the subject of the videographer’s aesthetic and critical gaze. Instead, it shares an analytical focus due to the monitor’s capacity to offer real-time feedback and their ability to see the motions of the videographer as they work.

During the 70s, Flusser started to develop a phenomenological analysis of cultural techniques and channels of communication, which was further developed in the following years and published with the title *Gesten. Versuch einer Phänomenologie*. In the chapter *The gesture of video* (*Die Geste des filmens*), the author argued that

film is an artistic tool: it depicts; video, conversely, is an epistemological tool: it presents, speculates, and philosophizes. The contrast is not necessarily functional. Film can present (e.g., in documentary), and video can represent (e.g., in video art). Nevertheless, the origin of the tool “video” gives the impression of a whole series of epistemological virtualities that have not yet unfolded (Flusser [1991]: 124).

As Schwendener argued (Schwendener [2018]), the Czech thinker recognized an epistemological exploration of the dialogical and discursive dimension of videos in the work of Fred Forest. Flusser considered his work unique from many other artists who experimented with video, because Forest was fully aware of its epistemological dimension. In particular, he insisted on the importance of Forest's dialogical experiments, a practice able to generate unprecedented forms of images and to inaugurate new forms of interaction.

3. THE VIEWERS AS CO-AUTHORS AND THE ISSUE OF IMMATERIALITY IN THE AESTHETICS OF COMMUNICATION

In an essay that the Scholar Michael Leruth (Leruth [2017]) dedicated to Forest's artworks, he stated that Flusser mentioned but did not analyze what is likely to be the best illustration of Forest's epistemological use of video in his work, a 1973 oeuvre titled *Archaeology of the Present: Electronic Investigation of Rue Guénégaud*.

The artist employed a closed-circuit video installation to transport the environment of the gallery into the street and the unfiltered reality of a Parisian street into the *Galerie Germain*. The basic idea behind the project was to use real-time closed-circuit video to metaphorically bring the space of Rue Guénégaud into an art gallery and the gallery space into the street, with the street serving as an art object and the gallery world serving as a visual clutter exposed to the bemused scrutiny of bystanders.

The street footage was shown in two different locations of the gallery. Firstly, on a line of screens without any commentary, where viewers probably took it at face value as unadulterated, in-the-moment reality; secondly, it was projected, practically life-size, onto a vast scale wall of the museum, where it looked like it was recorded in a different time.

The artist's intention was, on the one hand, to create an artificial gap in historical time in order

to elicit a new kind of perspective; on the other hand, he intended to distort and intensify the spectator's dual position of observed object and observing subject. In fact, his poetics was based on the refusal of object-based art, favoring the idea that artistic and communicational events, consisting entirely of the relational dynamic and intersubjective knowledge that results from public participation, should reshape both the social contexts and the media environments.

Furthermore, in Forest's poetics, the artist should aim at developing an open system that allows the viewers to become co-authors. In his view, the work itself does not exist as a stable representation of reality that the public may view as an aesthetic object (or anti object). Instead, it is an instance of information in flux that briefly arises through direct public contact, derived as well from the study of how the artistic space is socially constructed.

The research dedicated to the aesthetic properties of telecommunications media was developed by Foster throughout the creation of the *Groupe International de l'Esthétique de la Communication*, presented in 1983 by Fred Forest, the Italian philosopher Mario Costa and the conceptual artist Horacio Zabala. If several artists at the time were interested artistic possibilities related to new electronic media, the members of the *International Group for an Aesthetics of Communication* focused their interest on the impact that the emerging communication media technologies were exerting from a perceptual and experiential point of view.

According to their perspectives, artworks, information, and art systems must all be viewed as integrated wholes that cannot be reduced to the sum of their material components. The artwork as a "whole" is no longer defined by a physical medium, nor by its graphical depiction, but rather by aspects that are only perceptible to our awareness, since its substance, consisted in electric signals that make possible the information technology: the communication artist aimed at diverting the emerging tools of knowledge to broaden the viewers' perception and to revitalize their approaches to thinking, seeing, and knowing. In this perspec-

tive, the concept of “relationship” played a key role, as it allowed to examine reality as a “whole”, as a complex web of connections and interactions, and to interpret art as a systemic concept, in direct dialogue with cybernetics and information theory.

In the essay titled *Le sublime et l'esthétique de la communication* (Costa [1986]), the co-founder of the Group for an Aesthetics of Communication Mario Costa argued that the event of the aesthetics of communication was not to be intended as a mobilization of “concepts”, but rather as a mobilization of energy. The immaterial tensions of the field were the substitute for the aesthetic object and form, as the technologies of communication were capable of subverting the traditional notion of event.

The issue of the immateriality in the aesthetic of communication was addressed in the exhibition *Les Immatériaux*, curated in 1985 by Jean-François Lyotard, which linked the post-modern condition with the tendency toward dematerialization. Pierre Moeglin (Moeglin [1985]) criticized the exhibition by stating that the process of dematerialization, rather than through material artworks, would have been better expressed by presenting works that no longer concerned the final product, but rather the process. Instead, Costa's concept of immateriality consisted in the negation of the difference between a foreground of material nature and a background of spiritual nature in artworks, and differed from Lyotard's perspective and his idea of “representing the unrepresentable” through art works, and from his interpretation of the concept of “sublime”. In 1984, Lyotard published an article dedicated to the *Sublime and the Avant-garde* (Lyotard [1984]). In the paper, he argued that Burke's and Kant's aesthetics of the sublime «outlined a world of possibilities for artistic experiments in which the avant-gardes would later trace out their path» (Lyotard [1984]: 161). In contrast to Lyotard's idea that the properties of the sublime belong to the matter of art itself, and that the task of the sublime consists in approaching “presence” without recurring to representation (Rancière [2004]), Costa conceptualized and advocated an aesthetics of simultaneity

at a distance, and the replacement of the beautiful with the “technological sublime”. In the essay titled *Le sublime et l'esthétique de la communication* (Costa [1986]), he argued that the immaterial did not need to be represented anymore, because communication technologies allowed to “presentify” the immaterial electronic fluxus. The Italian thinker stated that the sublime stemmed from exorbitant and outsized experiences, and that in the case of the technological sublime, it emerged from the process of symbolic de-subjectification related to the self-developing and self-organizing complex of new electronic and digital technologies.

The issue of immateriality was tackled as well by the French philosopher Paul Virilio, who argued that technological developments in the fields of communication had produced a new world where speed was the guiding principle. In the essay *Speed and Politics*, Virilio (Virilio [1977]) deepened the concept of “dromology” (*dromologie*), a phenomenological perspective aimed to address the impact that the communication technologies had on perception, and how they were transforming the collective spatial and temporal experience through their character of speed. From an artistic point of view, with the concept of “aesthetics of disappearance”, the French thinker described how cinema, unlike sculpture or painting, produced artistic forms that do not need lasting material support, inaugurating a different logic within the more general space of artistic production. If a sculpture has consistent shape that endures over time because of its materiality, in the case of the cinematic picture the reference to a temporal dimension of exposure replaced the spatial and material references, favoring what Virilio refers to as a “intensity” of a temporality of exposure.

In an interview published in 1988, Virilio and Foster addressed their approaches to modern aesthetics, and the former stated that:

the world can no longer be represented through a sculpture, or the fixed image of a painting, and its right representation consists in the speed of the

movement, in the juxtaposition of sources of information, the simultaneous heterogeneity of its physical and electronic supports. (Forest, Virilio [1988]: 14)³

In their views, the world had to be portrayed through an “aesthetic of disappearance” marked by a quick instability and dematerialization, rather than an “aesthetic of appearance” based on gradual emergence and permanence through time.

4. INTER-SUBJECTIVE AND RELATIONAL APPROACHES TO ART

The relational basis of Forest’s art is explicitly mentioned in the third manifesto of the members of the *Art Sociologique* collective, published in 1976, aimed at fostering the transition from an aesthetic perspective based on objects and representation, to one that – by creating systems of relations – emphasizes information and interaction. Similarly, in his essay *Relational aesthetics*, Bourriaud (Bourriaud [1998]) offered a vision of contemporary art as an experience of social relationship, evident in those artistic practices that take as their theoretical point the human relational aspects. The inter-relational paradigm, based on the exploration of various forms of subjectivity’s founding interdependence, «links up most of the century’s avant-gardes, which called for a joint transformation of attitudes and social structures. Dadaism, Surrealism, and the Situationists» (Bourriaud [1998]: 44). Compared to Neo-Avant-garde artists such as the collective *Fluxus*, the role of artworks «is no longer to form imaginary and utopian realities, but to actually be ways of living and models of action within the existing real» (Bourriaud [1998]: 44).

In this regard, Claire Bishop (Bishop [2012]) noted that – in the last decades – several artists developed a series of practices pioneered by Neo-Avantgarde movements such as Fluxus and Neo-Concretism, consisting in seeking to forge co-authoring and participatory social body, where the artist plays the role of a collaborator in creating

peculiar circumstances rather than the solo creator of disparate items.

Conversely, argued Bishop, the increased activation and agency of the audience risks of leaping into the consensual consumption of the viewers’ image, and participation risks of plunging into mere spectacle. To avoid this risk, the author underlined the importance of creating a tension between the polarities on which interactive art is founded, such as author-spectator and individual-collective, without collapsing them.

In participatory art – a term which includes a variety of practices, such as collaborative art, community-based art and contextual art – those who were watchers became participants and often protagonists of a creative process aimed at restoring a collective space of shared social engagement.

An aspect that differentiates the avant-garde artistic experiences from the early technical feedback-based art initiatives lies in the fact that the latter used electronic media, and was closely related to cybernetic concepts. Furthermore, in some cases, the artists came from the computer science field, and labelled their creations *cybernetic* or *reactive*, laying the groundwork for the subsequent development of interactive art.

5. THE AESTHETICS OF INTERACTIVE MEDIA ART

In Kwastek’s perspective (Kwastek [2016]), the aesthetics of interactive media art, compared to the perspective of reception aesthetics, places the focus on the process of artistic creation, on participation and on the recipient’s experience, which is the main source of the aesthetic experience. Although the work is involved in both production and reception, in interactive art they are clearly distinct processes. The interactive work – which is what sets it apart from typical visual artworks – does not perform its function in the absence of the receptive act.

On the one hand, in interactive art the focus is on technologically mediated feedback procedures rather than on direct communication. On

³ Our translation.

the other hand, when it comes to interactive art, the “recipients” are not presented with an artistic offering that calls for observation; instead, they must first make the object available by their action before any act of contemplation (or reflection) is feasible. Another standout quality of the digital medium is its adaptability to the demands of a single user or intervention, as shown in artworks where the user’s unique profile serves as the foundation for the evolution and modification of the piece. While some digital art pieces are primarily aesthetic (Hansen [2016])⁴, others are more interested in databases or raw data.

By examining the aesthetic mechanisms at play in this branch of the arts, Kwastek (Kwastek [2013]) notices that the subjectivity of the unique perspectives of researchers and recipients is what limits research on reception aesthetics. Such consideration holds true for all analyses of creative works, but it is notably valuable for analyses of works that are based on open interpretability rather than conventional sign systems, and it is much more accurate for analyses of works that depend on receiver activity to take on their final form.

On this regard, Paul (Paul [2016]) noticed that any interaction with an artwork ultimately relies on the recipient’s fabrication of meaning through a complex interplay of situations. However, when it comes to seeing classic art forms, this interaction is still a conceptual event in the viewer’s head; the materiality of the painting or sculpture does not alter before his or her eyes. In digital art, interactivity enables many ways of exploring, putting together, or adding to an artwork beyond this merely cerebral experience. While performance art, happenings, and video art have all addressed the user’s or participant’s interaction with artworks, we are now faced with complicated possibilities of remote and instantaneous intervention exclusive to the digital medium. Furthermore, the

author underlines how the potential for dynamic interaction in digital art goes well beyond the straightforward ‘pointing and clicking’ that provides nothing more than a sophisticated way of seeing work or the sort of interactivity where a user’s input prompts one particular answer. Digital art frequently relies on participative, multi-user input and is not always collaborative in the word’s traditional meaning.

6. TTI TECHNOLOGIES, META-OPERATIVITY AND INTERACTIVITY

In a recent essay, Paul (Paul [2020]) argued digital art is now «predominantly understood as digital-born, computable art that is created, stored, and distributed via digital technologies and uses the features of these technologies as a medium». According to this interpretation, artworks produced by Text-to-Image (TTI) technologies, could be considered as forms of digital art. Text-to-image AI generators are applications that create a picture that matches the text prompt that serves as the user’s input for a natural language description of an image (Reviriego [2022]). Softwares such as *Dall-e 2*, *Imagen*, *Colab* and *Midjourney* allow the users to obtain get the visual depiction of a written text by drawing on vast images’ databases, associating them with tags, words, and phrases, and then producing a synthetic image.

In the contemporary scenario, an aspect of interest that concern the relationship between the technological re-mediation processes and the meta-operative nature of human creativity is, in fact, the emergence of TTI, which allows the creation of images through text commands. A meaningful example is represented by Jason Allen, who in September 2022 won the Colorado State Fair’s annual art competition with a work titled *Théâtre D’opéra Spatial*, created with Midjourney⁵.

⁴ Mark Hansen, for example, takes the perspective of reception aesthetics to examine the digital age new understanding of the image and its new concepts of the body, supporting his philosophical theories by thorough analyses of media art.

⁵ In particular, Allen won the prize dedicated to the division for “digital art/digitally manipulated photography” (the rules of the category allowed artistic practices that used digital technology as part of the creative or presentation process).

By generating images from natural language description, digital images generated with deep generative models might revolutionize the manipulation of visual symbols and, as Oppenlaender argued (Oppenlaender [2022]), a main question arises: how does human creativity fit into the process of creating images using text-to-image systems? The author argues that users cede partial control to artificial intelligence when producing text-based art (TTI). As a result, human creativity in text-to-image synthesis arises from human interaction with AI and the practices that develop as a result of that interaction, rather than from the final result. At the same time, a community-driven, developing an ecosystem of tools and resources shapes and informs the practices related to TTI and its peculiar form of creativity.

If the creativity in text-to-image synthesis arises from a linguistic human interaction with AI, and the practices that develop as a result of that interaction, can text-based be considered a form of creative and interactive artistic expression?

An aspect that allows to discuss the issue of the creative features involved in the use of TTI, regards the meta-operative processes involved. The meta-operative attitude, consisting in an internal and distinctive feature of human technical behavior, is expressed in the use of tools not just to pursue a specific goal, but in using them to build further ones. It is the aspect that distinguishes the one-dimensional operative behavior of non-human animals from the multi-dimensional one which characterizes our species. Garroni's analysis of meta-operative and creative traits of the human technical specificity (Garroni [1978]) leads to define new implications, aspects and dimensions in contemporary research on the processes of re-mediation that are rapidly and increasingly modifying expressive human behavior. The pragmatic feature of technical distancing has recently been addressed by Montani (Montani [2020]), who applied the notion of meta-operativity to the contemporary scenario, defined by the pervasive presence of digital devices. Such an increasing presence, according to this perspective, attributes central importance to the dialectic

of meta-operations. The author argued that meta-operativity might either evolve towards self-referential escalation, a process of anaesthetization that would reduce the contingency of our environment, or move in the direction of its enrichment and re-organization. Which of the two regards the most recent development of TTI? According to Oppenlaender, «the images may not be the fruit of human creativity. Instead, the images are a result of computational creativity» (Oppenlaender [2022]: 7). Nevertheless, on the one hand, the artistic use of text-to-image art is comparable to how photographers choose and organizes pictures from a broader library. On the one hand, the process use of Text-to-image technologies' systems works iteratively, and is exploration-driven, contextualizing the curative-creative feature of TTI within a wider process of image generation.

The use of prompting is a meta-operative skill, which requires a peculiar use of language, whose effectiveness depends on one's familiarity with the training set as well as their knowledge of and experience with the process of modifying prompts, named prompt engineering. As the author underlines, the effective use of prompt modifiers requires understanding the system's training data, the setup parameters, and the aspect ratio of a given topic.

7. TTI AND INTERACTIVE MEDIA ART: NEW POSSIBLE SCENARIOS?

The issue of the Text-to-Image Art's meta-operativity can be referred to the process, the prompts and the system.

Firstly, the process implemented to generate the picture might be the outcome of a laborious iterative process that involves a complex interaction with the system that defines prompt engineering for text-to-image synthesis. Secondly, the issue of the prompt engineering is further complicated by the fact that some Text to Image models⁶ accept not only textual prompts, but also images.

⁶ For example, *VQGAN-CLIP*.

Thirdly, numerous setup options on specific text-to-image systems may be changed individually to improve the outcomes. Understanding and modifying the setup variables is essential for differentiating between novice use of default settings and skilled and intentional understanding of text-to-image creation. In TTI, the images are the result of an input offered by a human, which is based on a meta-operative process, on the application of linguistic prompt within a constantly evolving setting, characterized by principles within the specific settings constituted by softwares that turns lines of text into hyper-realistic graphics, and can give origin to a creative behavior. Nevertheless, in its actual configuration, the interactive dynamic that characterizes text-to-image technologies refers exclusively to the image creation process, while the fruition of the artwork does not involve forms of generative feedbacks.

In the case of interactive art, the relationship between the artwork, audience and artist is reconfigured with an emphasis on viewer engagement and interaction with the work. Instead, in the actual configuration of TTI, the role played by digital technologies regards only the processual dimension managed by the artist and does not concern the mutual relationship between the viewer and the artwork.

The possibility to enable several ways of exploring and adding to a virtual artwork beyond the viewers' receptive experience is illustrated by Roberto Diodato (Diodato [2021]).

According to the author, a relevant investigation of interactivity in connection with the degrees of unpredictability made possible by virtual devices is particularly prominent in the work of the studio Fuse*. In the media performance and video installation *Dökk*, held in 2017, the Fuse* group designed ten consecutive rooms in which the interactive relationship between the viewer and the performer, mediated via digital devices, defined unique sound features and visual connotations. Six music tracks accompanied the video installation and were activated in response to algorithms that analyzed media messages that circulated in real-time, allowing the audience to

have differing degrees of influence over how the installation sounds and looked visually. By challenging the author's independent realization of the artwork, the described experiences created spaces able to foster a participatory dynamic and express the aesthetic potential of interactive media art. In our view, the possibilities that the text-to-image synthesis process offers in terms of allowing individual interventions to partially modify the resulting image – if merged with the forms of generative feedback typical of interactive media art – might disclose new directions made possible by virtual devices for further research on reactive and interactive scenarios.

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