

On the Imaginal Edge of Technologies

Introduction to *Imagining Technologies / Technologizing Imagination(s)* – Vol. I

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We find it appropriate to begin this introduction by explaining a variation from our initial project. The quantity and quality of the proposals we received convinced us to double this issue of *I Castelli di Yale*, dividing it into two volumes: the first – titled *On the Imaginal Edge of Technologies* – is the one introduced by these lines, while the next will be published by spring of next year. This change in plans represents the best acknowledgment of the value of our proposal to dedicate an *ad hoc* investigation to *the intimate relationship between imagination and technology*. More specifically, *the role that imagination plays in understanding our involvement in an increasingly technological world*, namely in a context where the *technisches Zeitalter* theorized by philosophical reflection nearly a century ago has since taken on the guise of a "techno-sphere," "techno-cosm," or even "techno-cene": the brand new *oikos* or living space within which the *conditio humana* must find its place.

The main common thread that emerges from the contributions hosted here, despite their diversity, confirms what was suggested by the CfA: *the relationship between technology and imagination is undergoing a substantial reconfiguration*, in the sense and direction of an *osmosis* or *chiasm*. That is to say, not only is imagination increasingly conditioned and «challenged forth» (in the Heideggerian sense) by the unstoppable technological development called to adapt to it (this is the most immediate evidence), but technology itself finds – or could/should find – in the efforts of imagination to keep pace with it, indications to guide its future evolution (this is the less immediate but likely more urgent evidence). As a

result, *finding new ways of thinking, investigating, and articulating our imaginative involvement in the technological (neo)environment* is becoming increasingly urgent.

Actually, it was precisely on this osmotic/chiasmatic outcome of the relationship between technology and imagination that we had placed our bet from the very beginning, titling the issue *Imagining Technologies / Technologizing Imagination(s)*, and it is precisely on such an aspect that this first volume already presents inspiring exemplifications at different levels. Hence, a possible “ideal index” for it would involve dividing it into three sections, that is, *scenarios* (Guchet, Dalmasso & Pirandello, Scotti), *cases* (Gerola & Robaey, Pezzano), and *authors* (Malaspina, Oraldi, Valenti).

With regard to the *scenarios*, Xavier Guchet’s essay (*The Imaginary of the Transplanted Organ*) proposes a comprehensive rethinking of the epistemology and even the ontology of *organ transplantation*, opposing the remnants of Cartesianism that still persist in the medical(ized) conception of the body. The author aims to demonstrate how the imaginary associated with this field can «benefit from being examined in the light of the premodern Greek concept of *organon*».

Anna Caterina Dalmasso and Sofia Pirandello (*Augmented Imagination. Thinking Technology Beyond Externalisation*) focus on the dialectic between «*prosthesis*» and «*epithesis*», namely the «*two-fold dynamic*» between externalization and internalization, aiming to establish «how technologies produce an amplification of the powers of imagination». In other words, whether and how «*augmented reality*» can also give rise to an «*augmented imagination*».

Alessandra Scotti’s essay (*Technological Imaginaries: What Images for AI?*), on the other hand, deals with the *connection between images and imagination* in the face of that cutting-edge phenomenon of current technological development: AI. Drawing on insights from visual culture, the author examines the «*agentive*» and even «*thoughtful nature of AI images*», conceiving – following Castoriadis – the AI imaginary as «*both instituted and instituting*».

More generally, in the face of scenarios that are largely still taking shape, the authors featured in both volumes – and this is one of the reasons we are particularly grateful to them – have chosen to “accept the challenge”, setting aside many of the prejudicial cautions and/or fears typical of the first generation of philosophers (and philosophies) of technology.

Concerning the proposed *concrete cases*, consider the challenge of a strong contamination/hybridization presented in Giacomo Pezzano’s essay (*Comic Ideas. Reimagining Philosophical Practice in the Digital Age*), where philosophy agrees to renegotiate its basic rules of engagement. Our «increasingly visual mediascape» opens up the possibility of «imagining new ways of doing philosophy» by situating it in «*a new epistemic environment*». This is the essence of the project of a “comic-philosophy”, based on the idea of «*comicepts*»: philosophical concepts «created and communicated by leveraging the specific features of comics as a medium».

Starting from the idea of imagination as «a collective capacity that supports forms of resistance and resilience», Alessio Gerola and Zoë Robaey (*Capturing Sustainable Imaginaries: Solarpunk as an Exercise in Radical Imagination*) emphasize the contribution that the «*radical imagination*», or the «*subversive imaginary*», of Climate Fiction and particularly *solar punk*, could offer to philosophical reflection at both an aesthetic-theoretical and a political level. However, this unprecedented “imaginative tank” must be safeguarded against the risk of «*elite capture*», which represents the dark side of its very success.

However, within a landscape characterized by «total (and perpetual) mobilization», some fixed points, some philosophical compasses, become a necessary support. It is impossible to face the challenge that technology poses to imagination today “bare-handed”, that is, without equipping oneself with an adequate toolbox. In the *authors/currents* section,

the volume therefore includes contributions dedicated to figures who are increasingly gaining the status of “classics” in the field of the most recent philosophy of technology and STS studies, after the so-called “empirical turn”. This is the case, for instance, with authors like Gilbert Simondon, Bernard Stiegler, and Don Ihde.

Cecile Malaspina’s essay (*Imagination and Invention: Rethinking AI as ‘Automated Optimization’ (AO) with Yagmur Denizhan and Gilbert Simondon*) addresses the issue of AI through the lens of Gilbert Simondon’s philosophy of technology and the more recent reflections of Yagmur Denizhan. Highlighting the role of «*dedifferentiation*» and «*metamorphosis*» in the constitution of imaginative processes – namely, the value of technological invention in living beings – the author suggests to rethink (i.e., re-imagine) AI no longer as «*artificial intelligence*» but as «*Automated Optimization*».

Antonio Oraldi (*Phantasy, Technology, Critique: On Bernard Stiegler’s Pharmakology of the Imagination*) deals with the relationship between imagination and technology through the lens of Stiegler’s philosophical *Pharmakology*. Specifically, the author highlights the necessity of a «*politics of the technologized imagination*», emphasizing how Stiegler’s notion of «*exteriorized imagination*» offers a critical framework for *theorizing how the human subject is co-constituted with technical prostheses* in the context of high-technology societies», making it «*a vital tool for social critique in the digital age*».

Riccardo Valenti (*Imagi(n)g technologies: On Don Ihde Post-Phenomenological Account of Technoscience: What is Really Made of?*) engages with Ihde, particularly with the “*techno-scientific side*” of postphenomenology. By reinterpreting Husserl’s legacy, Ihde redefines the relationship between perception and technological tools, arguing that *technologies allow us to «detect unseen phenomena»*, thus “tilting” both our perception of the world and our imaginative capability. The chiasm between technology and imagination thus becomes a compass capable of guiding us through a future and a past that are mysterious and distant, but at the same time crucial, for understanding «*The Human Place in the Cosmos*».

On the other hand – and we add “*fortunately*” – the establishment of this “new pantheon of classics” does not translate into an iconoclastic operation against the previous pantheon, namely a *damnatio memoriae* toward the «*founding fathers of the philosophy of technology*», who instead remain valuable, and in certain aspects indispensable, points of reference. In this sense, Guchet’s work is particularly emblematic, as he takes a stance on a highly current debate, that of organ transplantation, arguing that «*viewing the organ as an instrument does not necessarily imply subscribing to the conception of an organ as a tool*». For such a purpose he makes use of a classical lexical and conceptual toolkit, ranging from Whitehead’s concept of «*bifurcation of nature*», to Merleau-Ponty’s distinction between «*Leib*» and «*Körper*», to Heidegger’s distinction between «*Fertigkeit*» and «*Fähigkeit*», and even to Aristotle’s distinction between «*organon poietikon*» and «*organon praktikon*». But the same could be said, for example, for the presence of Ernst Kapp and André Leroi-Gourhan in Dalmaso & Pirandello’s essay, or of Cornelius Castoriadis in Scotti’s pages.

Finally, another reason why we can be satisfied with the outcome of this project is that it reflects a *philosophical biodiversity* that mirrors the differences that exist, first and foremost, between the editors themselves and, more generally, does justice to the variety of approaches currently present in the field of philosophical reflection on technology. This means that the criterion for selecting the proposals was not their “ideological orthodoxy” – in the sense of “fidelity” to an assumed editorial line – but only their intrinsic value, their “*scientific quality*”, understood in terms of competence, rigor, and the commitment that is evident in the various essays. Such a result would not have been possible without the invaluable and generous help of the reviewers and the editorial team of *I Castelli di Yale*

(especially Dr. Maurizio Trudu), to whom we take this opportunity to sincerely express our gratitude.

That said, as is only right, *habent sua fata libelli*. We therefore entrust the pages of this first volume to the readers, with the firm hope that they will be able to stimulate further reflections and imaginations (both in terms of proximity and agreement, as well as distance and critique), which our *techno-Lebenswelt* increasingly and urgently needs.

The Imaginary of the Transplanted Organ

Xavier Guchet

Abstract. *Transplant medicine seems to illustrate well the gulf between a Cartesian conception of the body (a machine made of spare parts) and a phenomenological one (the body is the "vehicle of our being in the world", the seat of our experiences, suffering and valuations, the support on which our identity is built). Can we leave it at that, with the body irrevocably "bifurcated" in transplant medicine? This article answers in the negative. It demonstrates that the conception of the organ underlying transplant medicine is not Cartesian, but Aristotelian in origin, the organ being seen not as a separate part of a machine, but as an instrument (organon). However, viewing the organ as an instrument does not necessarily imply subscribing to the conception of an organ as a tool. Based on a commentary on Heidegger and Agamben, the article argues that there is a need to distinguish two separate meanings of the Greek concept of "organon". This distinction leads to a few practical suggestions for doctors, engineers and healthcare policy-makers.*

Keywords. Aristotelian, Cartesian, body, instrument, organ.

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I. Introduction

Organ transplantation is a field of medicine that illustrates particularly well the gulf between two opposing positions on the body. On the one hand, the body is viewed as an object reducible to what science says about it, made available for all kinds of medical and technical interventions. On the other, the body is our «own body» (*corps propre*), the «vehicle of our being in the world» (Merleau-Ponty), the seat of our experiences and affective investments, of our suffering and our valuations, the support on which our identity is built. Body-object versus body-subject. This gulf has widened even further with a greater use of technology in transplant medicine, to improve transplant outcomes or, increasingly, to take the place of traditional transplants. The shortage of organs for transplant is widely considered to be a serious problem warranting substantial research and investment aimed at establishing technological solutions. These solutions can involve increasing the number of grafts suitable for transplantation through the use of perfusion machines that optimize the preservation of organs between their removal from the donor and their transplant into the recipient, enabling their quality to be finely assessed and even improved. Alternatively, they can involve the development of artificial or bioartificial organs, extracorporeal or implantable, to replace the use of donor organs. The consequence is to make the body more technologized than ever before, confirming a long-held belief that transplant medicine and its associated technologies are destined to bring to its fullest expression the great divide of modernity, what the philosopher Alfred North Whitehead called the «bifurcation of nature», that is to say the irreconcilable duality between

the nature apprehended in awareness and the nature which is the cause of awareness. The nature which is the fact apprehended in awareness holds within it the greenness of the trees, the song of the birds, the warmth of the sun, the hardness of the chairs, and the feel of the velvet. The nature which is the cause of awareness is the conjectured system of molecules and electrons which so affects the mind as to produce the awareness of apparent nature. (Whitehead 1920, 31).

The bifurcation of bodily nature reflects the opposition between the body as an object of technoscientific knowledge and practices, and the body by which a subject has feelings, experiences and awareness of the world around it.

Can we accept without question the perfunctory diagnosis, often made, that transplant medicine and its associated technologies are the culmination of the “bifurcation” of the body posited by Descartes? Does organ replacement medicine take us further towards the idea of the body-machine as opposed to the soul or spirit, whose representations, feelings and emotions are always liable to be revoked and disqualified? This would appear to be the case, in particular, for transplant patients, whose feelings and experiences are not only called into question, but also denigrated and devalued by positivist doctors who take an objectivist view of the body and its organs, considering them to be entirely analyzable in terms of structure and function – and who consequently consider that patients’ psychic and emotional investments in them can only be spurious and unfounded. Such psychic and emotional investments are held to be purely imaginary, or even delusions in need of psychotherapeutic treatment.

Can we leave it at that, with the body irrevocably “bifurcated” in transplant medicine? This article answers in the negative.

At this point, we need to distinguish two possible meanings of “bifurcation” in relation to the body.

First, the term may allude to the rejection of claims by transplant recipients that they feel the donor’s presence within them. Recipients of transplants may report having new tastes, new quirks, new dreams that connect them directly to the person (most often deceased) from whom their graft came – in short, they may report experiencing deep changes in their identity and personality (for a general overview, Carter et al. 2024). A well-documented case is that of Claire Silvia, who received a heart-lung transplant in 1988. In her 1997 book, she described the changes she experienced after transplantation:

I had dreams and experienced changes that seemed to suggest that some aspects of my donor’s spirit and personality now existed within me [...] Sometimes I had the feeling that somebody else was in there with me, that in some intangible way, my sense of “I” had become a kind of “we”. Although I couldn’t always detect this extra presence, at times it almost felt as if a second soul were sharing my body. (Silvia 1997, 131).

She felt deep changes in her tastes, even starting to drink beer and eat nuggets (things that she never did before). She adopted new daily rhythms, becoming a night owl. She had a dream involving a young man named Tim and then, several months later, she identified via a newspaper article her very likely donor, whose name was also Tim.

These kinds of animistic claims to which transplant patients often give voice have been intensively documented by social scientists:

Recipients [...] defy the opposition of clinical professionals who work to dissuade them from identifying psychologically with their donors. In cases involving kidneys, for example, children may worry they will acquire the negative qualities of feared or estranged parent donors [...] The imagined traits of anonymous donors may also develop into elaborate embellishments on a recipient’s personality and may affect body image [...] Recipients of cadaver organs, like those with

organs from living relatives, often express the sentiment that one can acquire the donor's emotional, moral, or physical characteristics. Such qualities can be elaborate and imaginative, especially when the donor was an anonymous stranger. Some patients live in fear of the independent or animate qualities of their new organs. Others more typically feel, for example, younger and stronger with a young man's lungs or more gentle with a woman's heart. One lighthearted response came from a fireman, who said, 'The guys I work with are always kidding around. They say, "Heh, Sam, you better watch out! You might just start peeing sitting down now that you have that lady's kidney!'. So every day I assure them, nope, I'm still peeing standing up! (Sharp 1995, 365, 372).

Despite the power of medical discourse working against animation of organs by patients and the flat rejection of the possibility of any transformation in subjectivity on the part of virtually all doctors, it is clear from numerous interviews carried out independently by Leslie Sharp (1995) and me that a large number of patients... undergo a profound change in subjectivity and report that they experience embodiment in a radically different way after a transplant. (Lock 2002, 1411).

Lock reports the case of Katherine White, who received a double transplant of liver and kidney and experienced some significant changes in her tastes:

You know, I never liked cheese and stuff like that, and some people think I'm joking, but all of a sudden I couldn't stop eating Kraft slices – that was after the first kidney. This time around, the first thing I did was to eat chocolate. I have a craving for chocolate and now I eat some every day. It's driving me crazy because I'm not a chocolate fanatic. So maybe this person who gave me the liver was a chocoholic?! (Lock 2002, 1411).

Some people think that the self continues to exist after death by virtue or means of parts of the tangible, personal body that are implanted in another body [...] donor families relate to the prospect that the body or its organs can perpetuate the memory of the donor through the donation [...] Transplantation enables the continuation of the donor's self-identity, whose body continues to exist through the organs transplanted into the body of another person. (Ben-David 2005, 101-102, 111-112).

«Recipients do in fact imagine a donor's identity in all sorts of ways and frequently integrate this unknown Other as an intrinsic part of their subjective sense of self» (Sharp 2006, 5).

Despite the efforts of psychiatrists and surgeons to put forward a merely mechanistic understanding of the parts of the body involved in organ transplantation, many recipients believe that a connection is made between their selves and the other in their bodies [...] Some recipients as well as the families of some donors have a strong wish for the continuity of a person by means of the donated organs. (Schicktanz & Wöhlke 2017, 115).

This animism has no place in contemporary medicine, and is most often dismissed by doctors, who see it as a pathological reaction, a post-transplant syndrome.

Psychiatric and psychological specialists (including psychiatrists, psychiatric nurses, psychologists, and social workers) play crucial roles in defining the parameters of normative behavior following transplantation. They voice a common concern: it is pathological and thus unnatural when recipients identify with their donors. They alert other professionals to the psychological dangers of such identification, formulating guidelines on how to help recipients extinguish their delusions and build a healthier sense of self [...] Such forms of transformed identity are considered pathological – and thus unnatural – and in extreme cases are labeled "psychotic reactions". (Sharp 1995, 359, 365).

Within the highly medicalized realm of organ transfer [...] talk of a multiple, disparate, or fragmented self is evidence of pathological thinking and requires therapeutic intervention... Transplant recipients who openly express the sense that another person dwells within them may well acquire medical labels that draw on monstrous imagery, such as “Frankenstein syndrome”. (Sharp 2006, 23).

The animistic of transplant patients feeling is sometimes explained by the existence of a «cellular memory» – the cells of the organ retain traces of the donor’s life (Pearsall et al 2002; Liester 2020). Though this idea is highly controversial, patient testimony seems to be acceptable only if it conforms to the requirements of modern “bifurcated” thinking in Whitehead’s sense: on the one hand, there is the lived experience, the subjective representations of the transplanted person; on the other, the underlying physico-chemical (or biological) mechanisms that causally explain this experience. The “bifurcation” is between, on the one hand, the body and the organ as seen by science, and, on the other, the symbolic representations and imaginary content with which transplant patients endow them – representations and contents that vary according to the nature of the transplanted organ: the symbolic weight of the organ has a profound effect on the transformation of identity. «In our culture, each organ has an assortment of metaphors associated with it that leads to various patterned responses among transplant staff, recipients, and the latter’s wide array of kin, friends, and acquaintance» (Sharp 1995, 372). «Different organs seem to be of different importance to the identity of the person» (Svenaesus 2012, 142).

The second meaning of the term “bifurcation” alludes to the gap between the conception of the body by transplant doctors and engineers – a machine made up of spare parts, replaceable at will – and the experience of patients who do not simply possess their body as a machine that must function and render them service, but who also are their body and must learn to live with their graft – which is far from simple for most. The “bifurcation” here is between having a body and being one’s body, between the body as seen by science and medicine and the body as experienced in daily life, enabling (or failing to enable) transplant recipients to resume the life they enjoyed previously.

The philosophical and social science literature most often treats these two meanings of the “bifurcation” of the body separately. Some works draw on the animistic testimonies of transplant patients to conclude that although historically the development of transplant medicine rested on a theoretical framework based on the “bifurcation” of bodily nature («Treating the body as something that is merely biological and mechanical makes transplantation possible because it sanctions taking the body to pieces», Ben-David 2005, 107), today it is paradoxically the very success of transplant medicine that is weakening this theoretical framework and prompting a departure from it (Solhdju 2020, 143-144). Other studies focus more on the day-to-day experience of transplant patients, the difficulties they encounter (the side effects of immunosuppressive treatments; the onset of new diseases; the fear of chronic graft rejection), and the limitations on their life options: contrary to what is claimed in triumphalist discourse, transplantation does not enable transplant patients to return to their former lives, many of them remaining unable to find a job and having to live with disabilities. As the Swedish philosopher Fredrik Svenaesus observes,

When the new kidney functions properly and is not rejected by the immune system, life after a transplant is not like life before the disease entered the stage. To suffer from a disease that destroys one’s kidneys and to receive a new kidney means that life becomes prolonged and normalized, but it never means that life becomes quite normal (the way it was before the onset of the disease) because you are at constant risk of renewed kidney failure and other problems. This leads to a life that is very self-regulated as regards the relationship to one’s own body. (Svenaesus 2012, 146).

Transplant patients often «[describe] how difficult they [find] the return to ordinary routines of family and social life. Some of them [suffer] from a variety of side effects from the drugs they [have] to take to inhibit rejection of the transplants; others [live] in constant fear of such a rejection» (Ben-David 2005, 6)

On the one hand, then, we have works that examine the spontaneous expressions of animism by transplant patients and how this animism affects how organs are conceived, and on the other, we have works that look at the “quality of life” of patients after transplantation. These two ensembles of works are not symmetrical: the first are anthropological in scope, emphasizing the need to redefine the very concept of “organ”, while the latter are more ethical and political in scope, and are less concerned with re-elaborating the concept of the organ than with reactivating a non-objectivist conception of the body, in a phenomenological vein strongly inspired by Merleau-Ponty (the «own body», the lived body as opposed to the body-object, the *Leib* as opposed to the *Körper*), which leads us to assess the consequences of transplantation for people who have received a graft or whose organ has been replaced by an artificial device (such as a hemodialyzer). The two types of work do, however, have a feature in common, namely their rejection of the Cartesian conception of the body as a machine, and of the organ as a part of such a machine. Cartesianism is equally incompatible with any kind of credence that might be given to the animistic testimonies of transplant patients and with approaches that focus on their daily experience after transplantation.

The article begins by examining the animism that transplant patients will sometimes express unprompted, and the dismissal with which their accounts of their experience tend to be met. I argue against the idea that imaginary projections are only to be found on the side of transplant patients, while doctors and engineers may rightly claim to be perfectly objective. Rather, I aim to show that the imaginary can be found on both sides: “to each his own imaginary world”, in short. On the side of doctors and engineers, an imaginary of the body-machine would seem to be particularly prevalent, and this needs to be examined more closely.

Next, the article takes a closer look at the part played by Cartesianism in the way people see transplantation. Do transplant physicians and engineers subscribe unanimously to the Cartesian conception of the body-machine? I answer this question in the negative, hypothesizing that the conception of the organ underlying transplantation medicine and organ replacement engineering is not Cartesian, but Aristotelian in origin, the organ being seen not as a separate part of a machine, but as an instrument. Thus, the article defends the counter-intuitive idea that transplantation medicine and its associated technologies, at the forefront of modern technoscientific medicine, benefit from being examined in the light of the premodern Greek concept of *organon*.

The article then examines an analogy sometimes drawn between an organ and an instrument whereby an instrument is equated with a craftsman’s tool – this being the analogy used by Heidegger. A number of authors have since rejected this analogy of the organ seen as a tool. The reasons for their rejection are analyzed.

Finally, the article argues that viewing the organ as an instrument does not necessarily imply subscribing to the conception of an organ as a tool. Based on the Italian philosopher Giorgio Agamben’s reading of Aristotle, there is a need to distinguish two separate meanings of the Greek concept of «instrument» (*organon*).

This distinction leads me to conclude with a few practical suggestions for doctors, engineers and healthcare policy-makers.

1. To each his own imaginary world

Holding firm to a “bifurcated” conception of the body, proponents of the objectivist approach describe the psychic elaborations around the transplanted organ as fantasies, or even delusions – in particular, they will tend to dismiss the testimonies of patients who feel, in one way or another, the presence of the donor within them (see the quotations and references above). They declare that the only “real” body is the body of science, the body of cellular, metabolic and organic functioning, and that everything else is merely subjective projection, the doubling of the “real” body by a fantasized body with no real foundation. They thus place what we might call the patchwork of assumptions and aspirations and mental images that inhabit one’s inner world, or more succinctly “*the imaginary*” (as we shall continue to refer to it below) on one side of a divide, with the other side (the side of scientists, engineers and doctors) remaining immune to the imaginary’s incursions.

Transplant medicine seems to fit in well with Simondon’s analysis, in the late 1950s, of imagination and the imaginary in their respective relationships to technology (Simondon 2017). Let us first consider imagination. For Simondon, imagination plays a very important role in technological invention: it is what enables an inventor to anticipate the relationships that a machine that still exists only in the mind or on paper will have with its environment once it is built and operational. These relationships are two-way: on the one hand, there are the effects that the machine will have on its environment during operation; on the other, the consequences that these effects will in return have on the operation of the machine. Simondon terms «concretization» the process of invention that gives these effects a functional, technical value: by virtue of a feedback loop that is established, the effects of the machine’s operation on its environment play an important, even decisive role in that operation. A functional synergy is established. “Abstract” engineering, as opposed to “concrete” engineering, consists in having each machine function performed by a dedicated structure. The “abstract” machine is the juxtaposition of parts that perform their functions separately, independently of each other. In the “concrete” machine, on the other hand, machine operation is not fragmented: there is functional interdependence between the different parts of the machine, and a unity of operation. Simondon speaks of a machine’s self-regulation: through its operation, the machine produces and maintains the conditions for its own functioning. The inventor is first and foremost a living being who, as such, has a sense of self-regulation of their own behavior: imagination is the ability to project this sense of self-regulation into a representation of how the machine operates, bringing with it this idea of the recursive effects of operation on the operation itself.

The imaginary, on the other hand, is something that is misleading and mystifying when it is applied to technology. The imaginary is what fills the gap where there is a lack of true knowledge of technology, its nature and its operating principles. Understood in this way as false and groundless representations, the imaginary teaches us nothing, and provides no insights or information about the world we live in.

Such a dismissal of the imaginary could almost serve as a mantra for proponents of the objectivist approach to transplant medicine. But only “almost”, because the history of artificial organ technologies makes it necessary to qualify the univocal evolution of these technologies towards “concretization”: current approaches to organ replacement through the design of extracorporeal or implantable replacement devices clearly reflect a trend towards “concretization”, insofar as many devices now being developed do not seek to reproduce organ functions via artificial processes (mechanical, electrical and chemical), but rather to recruit cells by providing environmental conditions such that they remain viable and functional *ex corpore* – precisely what Simondon called an «associated environment». However, other devices that have long been used in the clinic, such as hemodialyzers, remain based on what Simondon would term a purely artificial, “abstract” approach: detoxification, a

function of the kidney, has been isolated and is carried out by a machine that contains no cells but only inert elements. However, dialysis has been saving lives for decades: the technology may be “abstract”, but it is no less effective. Dialysis is also useful for patients with acute liver failure who are awaiting a liver transplant: some devices help to eliminate certain toxins that the liver no longer eliminates itself (such as ammonia), by performing a kind of hepatic dialysis, even though the liver is a particularly complex organ performing a very large number of functions (over five hundred), some of which are not yet fully understood. In other words, these liver dialysis devices are also “abstract”: they isolate one function of the liver – detoxification – from many others, and have it performed by extracorporeal machines without regard for the environment in which the hepatocytes (the functional cells of the liver) perform their innumerable functions. In short, organ replacement technologies actually used in clinical routine were designed using an “abstract” approach, while machines based on a “concretizing” approach are still under development (some at the clinical trial stage), with a number of thorny design issues that they raise yet to be overcome. The potential that Simondon saw in the concretizing imagination, which he deemed to be of greater relevance than abstract engineering approaches, is being realized only very slowly as regards organ replacement technologies.

On the other hand, Simondon’s diatribe against the imaginary might be echoed practically word for word by transplant surgeons, many of whom would be unwilling to recognize any place for that imaginary, or for any kind of psychosocial significance that the patient might see in the graft and the grafted body. What is particularly rejected is the animist imaginary to which some transplant patients give voice. Some patients claim that the grafts allow “communication” from their donor, giving them access to elements of the donor’s personality (Le Breton 1994; Morizot 2014; Solhdju 2020). Social science literature often mentions the rejection of these animistic claims by physicians who, on the contrary, will go to some lengths to disassociate the explanted organ from the person of the donor, to make it appear as a simple piece of organic matter, defined by its functions alone. The patient’s imaginary, that is to say the sphere in which their feelings encompass a whole range of representations and symbols relating to organs, is simply disregarded. The word “symbol” here is to be understood in its etymological sense of *symbolon*, i.e., as Simondon reminds us, of the object broken into two halves that complement each other: each half, separated from the other, calls for its complement (Simondon 2014b). As the transplant patient may feel, the organ is the symbol of the person whose organ it was, of his or her personality, of his or her sensations; it beckons towards its missing complement. Patients who have received transplants and who report experiencing new, hitherto unknown emotions, or who report developing new tastes, are referred to psychologists, or even psychiatrists, for appropriate treatment. Something pathological is suspected.

Numerous works in the social sciences have challenged this duality of body-object and body-subject, which separates the body that is the object of technoscientific medicine (the “real” body) from the patient’s “fantasized” body (see for instance Schweda & Schicktanz 2009). First of all, many of these works show that in reality there is no dissymmetry between the point of view of doctors and engineers on the one hand, and that of patients on the other. To each his own imaginary world, to each his own fantasies. In response to the disregard in which they are held, those sympathetic to a subjectivist approach denounce the brutal reductionism of the transplant professionals who see the body as a machine *partes extra partes* and the cadaver as a reserve of organs devoid of any value, and who deny the reality of patients’ feelings. In the subjectivist view, the “real” body is the lived body, the so-called “own body” (*corps propre*), while the body-object of science is no more than a derivative construction that has historical roots (notably in the history of anatomical dissection) and whose obliviousness to the non-physical is an aberration – it too being steeped in the imaginary. Technoscientific medicine has its own imaginary world. As Merleau-Ponty

said about Nature – but this also applies to the body – «We cannot think Nature without taking account to ourselves that our idea of Nature is impregnated with artifice» (Merleau-Ponty 2003, 86). The anthropologist Lesley Sharp has proposed the concept of «moral thinking» to refer to the structuring role of the imaginary among engineers developing vascular assistance devices – an imaginary that rests on a mechanistic conception of the body and its organs, implying an erasure of the body in its suffering-body dimension. Sharp sees this “body-machine imaginary” as guiding engineers’ design strategies, leading them, for example, to develop cardiac assistance systems based on their belief that the heart is only a pump (Sharp 2014) – which is certainly false, since the heart is also an endocrine organ, and far more complex than a pump. What is more, the field of organ replacement, regardless of what doctors and engineers who work in this field may say, is shrouded in an imaginary that revolves around ideas of human enhancement. This imaginary undeniably has played an integral role of the history of the field, as seen in pioneers such as Alexis Carrel, a eugenicist preoccupied with the prolongation of life (Carrel 1939; Friedman 2007). Transhumanists are today inspired by the achievements of transplant medicine, some even hoping that it may become possible to confer unprecedented functions on reconfigured, technologically advanced organs. As Sharp puts it, human enhancement seems to be the horizon of transplant medicine and its associated technologies (Sharp 2014). It should therefore be recognized that the imaginary is equally distributed among all the protagonists of transplantation. The imaginary is not confined to patients in thrall to an animism from another age, but is similarly present in physicians who are resolutely modern in their strict separation of facts and values, of the objective and the subjective, and who would draw a boundary between “naturalism” and the kinds of schemes of thinking and action that the anthropologist Philippe Descola has identified (animism being one of those schemes) (Descola 2014). The situation is more symmetrical than it might appear and, to parody Latour, the protagonists of organ transplantation «are not modern». Both sides find comfort in the unspoken premises of their own imaginary. And for both, it is the other’s imaginary that distances them from reality. The other’s imaginary is fallacious, the bearer of negative values.

However, the symmetry is not perfect: on the one hand, proponents of the objectivist approach (for concision, let us call them the “objectivists”) reject the entire imaginary component of transplantation on the part of their opponents (the “subjectivists”), considering themselves to be free of any such imaginary, while the subjectivists willingly recognize the existence of an imaginary on both sides. They will nevertheless contrast their own “good” imaginary (individual and collective psychic elaborations around the transplanted organ that allow it to be appropriated and integrated into a reconstruction of identity) with the “bad” imaginary of the objectivists for whom the body is a machine and the detached organ tissue a “spare part”, and who are thus indifferent to the values and symbolic dimension of the body and its parts.

This distinction between a “good” and a “bad” imaginary is open to debate. Subjectivists, rightly wanting to have the full legitimacy of patients’ testimony and feelings recognized, are perhaps too quick to disqualify the objectivist perspective. They are undoubtedly right in their belief that what patients have to say about themselves, their experience and their situation, deserve the utmost attention – but might they not be wrong in their wholesale rejection of the objectivists’ fragmentary conception of the body and the definition of an organ in terms of its structure and function? This objectivist, reductionist approach to the body surely cannot be completely wrong, given that in some cases it is successful in healing. As already pointed out, the dialysis machine, which is nothing more than an extra-corporeal artificial kidney, a pure machine, saves lives. Who could possibly deny that? Organ transplant is unquestionably dependent on a conception of the body as comprising separate components, a conception reinforced in the past by the practices of dissection and

the anatomical knowledge thus gained, and the fact remains that the transplanting of organs is of immense service to patients, giving them back their life expectancy and – admittedly not always – their quality of life. The imaginary whereby the body is an assemblage of parts and the organ a spare part that can be relocated from one body into another cannot be dismissed as devoid of all value and foundation, because transplant medicine *works*, having become the reference therapy for patients with serious organ failure. This in no way detracts from the value of what transplant and dialysis patients have to say about their experiences. The fact that their feelings do not align with the imaginary of the desymbolized, technicized body does not imply that this objectivist imaginary is purely and simply mystifying: it has an indisputable operative value.

It is worth going back to Simondon, who himself went some way to bridging the gap between technique and the imaginary in emphasizing the extent to which the imaginary can positively (rather than negatively) influence and support technique. In his 1965-1966 lecture on *Imagination and Invention*, Simondon described not only the positive role of imagination as a faculty for anticipating self-regulation in machines, but also the positive role of images and the content they convey (Simondon 2014a). He identified three levels on which images help to shape our relationship with technologies: the cognitive level, the conative level, and the affective-emotional level. From a cognitive point of view, images have an epistemic function, for example by generating analogies (the body as a *partes extra partes* machine) that guide research and innovation, with undeniable success. From the conative point of view, most researchers and engineers working in the field of artificial organs will defend the social utility and even moral necessity of their work given a shortage of organs: the lengthening waiting lists for transplants and the fact that patients on these lists often die before they can receive one provide a moral argument for those developing alternative solutions. Organ shortage is a powerful incentive for action: researchers and engineers are sought after and often have little trouble obtaining funding. Finally, this field of engineering is rich in affective-emotional content, particularly the sort of content that can be conveyed in the form of “what if” thought experiments: what if we had artificial livers on the shelf tomorrow, capable of providing a transitional or even permanent solution for patients suffering from severe liver failure? One hepatologist, the coordinator of a project to develop simultaneously an implantable artificial liver, an extracorporeal artificial liver, and a liver on chip, has expressed his concerns about this prospect. His feeling is that there could be a serious danger in having such organs on the shelf, since some people without any strong medical need might be encouraged to seek to have an artificial liver implanted, on the grounds that their existing liver could be “tired”, or damaged by an unhealthy lifestyle. A new, “high-performance” liver might appear an attractive prospect. Engineers like those interviewed by Sharp see artificial organs as devices whose bearers would ideally cease to be aware of them, organs that become “naturalized” – which, in the view of our hepatologist, could encourage even greater recourse to this type of device. But if we can “rejuvenate” our organs indefinitely in this way, what will become of our finitude and our relationship with our own mortality, both of which define our condition as human beings? As we can see, the imaginary, or rather, the imagination sharpened by the “what if?” question, gives significance as well as direction to scientific research and technological development.

Simondon’s view can thus be stated as follows: there are images that provide epistemically valuable analogies (the body in pieces, the detachable, transposable organ), that set things in motion (organ shortage being a powerful incentive), and that elicit affective-emotional reactions to spur science and technology on. These images might sometimes prompt members of the professional community to raise philosophical concerns, but will rarely exhaust their capacity for reflection.

2. Transplant medicine and Cartesianism

For many commentators, transplant medicine is a thorough vindication of Descartes and his conception of the body as a *partes extra partes* machine. The body-machine is seen as being central to the imaginary (as defined above) of transplant surgeons and engineers of organ replacement (Leder 1992, 2002; Hacking 2005, 2006). This triumphant Cartesianism is in reality merely a washed-out, oversimplified Cartesianism, since Descartes actually had more subtle views on the body. Be that as it may, it is a commonly held view that we are now witnessing the victory of a conception of the body and its parts that came into being with Descartes, and that has now been operationalized by transplant surgeons and engineers.

However, the connection between transplantation and Cartesianism is open to debate. It is not self-evident, either historically or conceptually.

From a historical perspective, the cutting open of bodies to remove organs is reminiscent of the technique of dissection, whose role in the development of anatomical knowledge from the end of the 13th century, as well as in the emergence of a mechanistic (or rather, machinic), Cartesian conception of the body, is attested to by historians (Mandressi 2003). That said, other historians have convincingly argued that transplant medicine was born at the end of the 19th century in the context of the rise of experimental physiology (especially in Germany) (Schlich 2013), which certainly cannot be described as Cartesian. The perfusion of explanted organs, initially carried out to gain a better understanding of organ functions rather than for therapeutic purposes, was the work of German physiologists in the mid-19th century. Carl Eduard Loebell, a pupil of the famous German physiologist Carl Ludwig, reported in his thesis (in Latin, defended in 1849) the first experiment in perfusing a pig's kidney. Perfusion machines subsequently underwent sustained technological development in the second half of the 19th century, culminating in the development of sophisticated devices whose overall layout was already that of today's machines (including a pump and oxygenator). In short, the excorporation of organs, which acquire a kind of life of their own by being kept "alive" outside the body through perfusion, and organ transplant as a therapy at the frontier between medicine and experimental physiology, are techniques that most certainly did not develop under the patronage of Descartes and in virtue of his conception of the body-machine. Alexis Carrel, a pioneering physician and biologist in various areas of direct interest to transplant medicine (vascular surgery, cell culture, and perfusion machines – not to mention the fact that Carrel himself was a very active transplanter in the early 20th century), was no fan of the Cartesian conception of the body – quite the opposite, in fact (Carrel 1939). He was very clear about his adherence to Bergsonian philosophy and Bergson's idea of the living organism, the very antithesis of the assimilation of the body to a *partes extra partes* machine. Some quotes from his book *Man the Unknown* (*L'Homme, cet inconnu*) are unambiguous. Referring not only to Claude Bernard but also to Bergson, Carrel asks:

Should an organ be defined by its histological elements or by the chemical substances it constantly fabricates? The kidneys appear to the anatomist as two distinct glands. From a physiological point of view, however, they are a single being [...] An organ is not limited by its surface. It reaches as far as the substances it secretes [...] Each gland extends, by means of its internal secretions, over the whole organism [...] The spatial and temporal dimensions of each gland are, in fact, equal to those of the entire organism. An organ consists of its inner medium as much as of its anatomical elements. It is constituted both by specific cells and specific fluid or medium. And this fluid, this inner medium, greatly transcends the anatomical frontier [...] In short, the body is an anatomical heterogeneity and a physiological homogeneity. It acts as if it were simple. But it

shows us a complex structure. Such an antithesis is created by our mind. We always delight in picturing man as being constructed like one of our machines. (Carrel 1939, 105).

It is therefore clear that when we look back to the dawn of organ transplant medicine and its associated technologies, we do not find Descartes there.

In fact, there is a confusion between two quite distinct theoretical moves: on the one hand, we have the act of divorcing the subject from the object, the mind from the body – an undeniably Cartesian move, that may be said to characterize scientific and technological modernity, and that is found notably in 19th century experimental physiology. On the other hand, we have the more situated, contextual act of assimilating the organism to a classical *automaton* – a move effectively made by Descartes in his *Treatise on Man*, but abandoned in particular by the vitalists of the 18th century and the physiologists of the 19th. The fact that transplant physicians and engineers deny any reality to the animistic feelings of patients, and keep the subjective and objective strictly separate, in no way implies that they unanimously adhere to the Cartesian conception of the body-machine: these are two different things. If experimental physiology and its offshoot, transplantation medicine, have “bifurcated” the organ, it is not by assimilating it to a Cartesian *automaton*.

It is thus historically inaccurate to see Cartesianism – and an oversimplified Cartesianism, at that – and the body-*automaton* analogy as the underlying philosophy of transplant medicine. It is also conceptually inaccurate. Transplant medicine is often associated with postmodern, post-Cartesian conceptions of the body, such as Donna Haraway’s concept of the “cyborg” – the cyborgian body undoes the beautiful unity of the organism as the total of its parts, and instead amalgamates organism and machine in cobbled-together arrangements of heterogeneous elements, protean assemblages that blur the boundaries between the organic and the technical (Haraway 2006). These bodies are hybrids, made up of devices (grafts) connected to other devices. This cyborgian conception of the organism is prefigured by Bergson and is a source of inspiration for Carrel. In *Creative Evolution (L’Évolution créatrice)* Bergson writes: «We may say that a higher organism is essentially a sensori-motor system installed on systems of digestion, circulation, secretion, etc., whose function it is to repair, cleanse and protect it» (Bergson 1944, 138). In higher organisms the nervous system is a device connected to other devices that serve it.

The testimony of philosopher Jean-Luc Nancy, a heart transplant recipient in the early 1990s who lived with his heart transplant for almost thirty years (and at the cost of serious medical complications), is also highly instructive. Nancy recounts his ordeal in *L’Intrus* (2002) but his conception of the body is mainly set out in *Corpus* (1992) – Nancy talks about an «excrit», composite body, which is neither inside nor outside, beyond any juxtaposition of machine and spirit or of a whole and its parts, but an open body whose law is intrusion – the continuous irruption of otherness, the impossibility of a resolution into his “own body” (*corps propre*). Here he is not talking about the cyborgian body, because cyborgian hybridity implies assimilation, a form of appropriation, fusion, the overcoming of intrusion; yet for Nancy intrusion cannot be circumvented, since it is the very nature of the body. The intruder that Nancy experiences is not primarily the heart transplant, but rather his own heart, which begins to malfunction and bursts in like a stranger, a trespasser. Before his illness there was no heart at all, and afterwards, there was something whose strangeness would not fade. «Something was detaching itself from me, or was coming up in me, there where nothing had been: nothing but the “proper” immersion in me of “myself” that had never identified itself as this body, even less as this heart, and that was suddenly concerned with and watching itself» (Nancy 2002, 4). In the early 2010s, Nancy had to have a hip replacement. After the operation he suffered a cardiac arrest and was fitted with a pacemaker. Two months later, the pacemaker was colonized by yeast and had to be removed and a new one fitted – in the meantime, the heart had to be perfused. The pacemaker

battery was implanted in his abdomen. Also implanted in Nancy's body was a subcutaneous injection chamber, put in place following Nancy's cancer. Nancy experiences his body «as more medicalized – or technicized – than ever, in modes that are at once mechanical, electrical and electronic, and finally chemical» (Nancy 2011, 50). Devices connected to devices, incessant intrusions. Thus, the body as revealed by transplant medicine is not the body-machine of Cartesian modernity: the transplanted body negates the dualisms of body and mind, the biological and the symbolic. The transplanted body is postmodern, cyborgian or «*excrit*».

Transplant medicine gives rise to what we might call a multiplicity of the body, in the sense of Annemarie Mol's *The Body Multiple* (2003): not a multiplicity OF bodies, not several bodies, nor several representations of the body or several ways of knowing it; there is a single body, my body, but a multiplicity of THIS body according to the contexts in which it is «enacted», i.e., produced in its reality as a body: the body of science, anatomy and physiology, in transplantation practices; the animistic body, blurring the boundary between self and non-self, "own" and otherness; the suffering body in the daily experience of transplant patients; the composite body, made up of organ-instruments connected to one another. There are no false images of the body as opposed to true images of the body, but instances of the body that are on the same level. Transplant medicine instantiates all these bodies, not just Descartes' body-machine.

3. From the organ as a "spare part" to the organ as an "instrument"

So, before his heart failure and the subsequent transplant, Nancy did not really have a body. We certainly have a body, our body, but this possession fades into the background and is forgotten in the day-to-day conduct of our lives, i.e., in all our activities where, with this body, we do something. What can I do with my body? I can, for example, climb mountains. For this I need equipment – an ice axe, carabiners, a harness, etc. – but I also need a body and a heart. All this fades away, is forgotten, when I am climbing the mountain. I simply do not think about it. The essential point in Nancy's depiction is that the heart is placed at the same level as ice axes and carabiners, that is to say it is seen as an instrument. Nancy puts forward a conception of the organ not as a piece of Cartesian machinery, defined by its structure and functions, but as an instrument that in some circumstances can become a bad instrument, a failing instrument that betrays.

Unexpectedly and surprisingly, Nancy finds Descartes here – not the Descartes of the *Treatise on Man* and of the body-machine, but the Descartes of the sixth *Metaphysical Meditation* and the analysis of the hydropic man who continually feels thirsty, even though, for him, drinking in excess is harmful, even fatal (Descartes 1999). Is God a deceiver, asks Descartes? He answers in the negative: God is not deceitful. He designed the human body in the best possible way, as an excellent instrument that most of the time performs its function perfectly. Unfortunately, sometimes, as a result of illness, this instrument will malfunction, it will betray me.

Nancy's formulation of his experience of transplantation therefore rests on an understanding of the organ as an instrument. The organ is comparable to an instrument, which brings us back to the old Greek word *organon*. In Ancient Greece this term was used to describe both a part of the body and an instrument, a craftsman's tool. Historically, it was Aristotle who systematized the use of the term *organon* – tool, or instrument – to designate body parts (Byl 1971). He thus established, for a long time to come, the close association between a body part and a given biological function.

At first glance, however, this return to the foreground of a conception of the organ as an instrument may come as a surprise. Even if to conceive an organ in this way were an

alternative to conceiving it as part of a Cartesian machine, it is hard to see a priori how this might help us better comprehend the animism voiced by transplant patients, or to better take into account their daily experience. Isn't that precisely how transplant doctors and engineers view the organ, that is to say as an instrument, a tool defined by the notions of structure and function? Doesn't the analogy between organ and instrument continue to require a "bifurcated" conception of body and organ (a conception by no means confined to Cartesianism)? The animistic perceptions and the difficulties experienced by transplant patients do not sit comfortably with a conception of the organ as an instrument. Quite the opposite: an "instrumentalist" conception of the body would appear to reinforce the objectivist position that considers organs solely from a functionalist point of view.

We should be grateful to Heidegger for pointing out the limits of the analogy between organs and instruments; more precisely, between organs and tools. In the metaphysics course he gave in the winter of 1929-1930, which addressed the question of life, Heidegger argued that contemporary biology and biotechnology had completely missed the essence of life, not because they had accepted the Cartesian assimilation of the organism to a machine, but because they had accepted the Aristotelian assimilation of the organ to a tool. Heidegger argued that the assimilation of organs to tools, and the organism to a complex of tools, is fallacious. The organ and the tool differ in terms of their respective relationships to the concept of utility: both the tool and the organ are "made for" and "serve" some purpose, i.e., they have a utility, but this "made for", this "service" has a completely different meaning in the two cases. What is the difference between the tool's "made for" and the organ's "made for"?

The organ, the eye for example, serves for seeing. The pen, a piece of writing equipment, serves for writing. In both cases we have a serving for something [...] but the pen is an independent being, something that is to hand for use by various different human beings. The eye, on the contrary, as an organ is never present at hand in this way. Rather, every living being can only ever see with its eyes [...] Thus we can recognize an initial distinction by saying that the organ is an instrument which is incorporated into the user. (Heidegger 1995, 219).

The first difference between organ and tool is therefore topological: the tool is excorporated, detached from the body, it does not belong to the space of the body, whereas the organ is incorporated, non-detachable. This first, topological difference does not yet lead Heidegger to conclude that the organ has nothing in common with a tool. But he then takes his analysis a step further. «As equipment the pen is ready for writing, but it has no capacity (*Fähigkeit*) for writing. As a pen it is not capable (*fähig*) of writing. It is a matter of distinguishing readiness, as a particular kind of potentiality which we ascribe to equipment, from capacity [...] The organ, we now claim, in each case has a capacity» (Heidegger 1995, 200-201). Heidegger thus points to a second difference between the tool and the organ, a more essential difference than the topological one: the tool is characterized by its independence from the use to which it is put, and from the user: once the tool ceases to be used, it does not disappear, and it remains what it is. It remains available, «ready for use» (*Fertigkeit*). When the craftsman has finished his work, he puts down his hammer, which ceases to be in use, but which does not cease to be a hammer. The organ, on the other hand, cannot be separated from use and the user, but is one with them: this is what defines Heidegger's concept of «aptitude» (*Fähigkeit*). Once the organ is no longer used, it ceases to be an organ.

The distinction between the concepts of *Fertigkeit* and *Fähigkeit* can be expressed in the Aristotelian distinction between «potentiality» (*dynamis*) and «actuality» (*entelecheia*). A thing is said to be "in potency" if it has not yet become what it is destined to be, by virtue of its internal dynamism – for example, the seed is not yet the plant, it is only the plant "in

potency”: it will blossom into a plant “in act” if nothing stands in the way of its natural becoming. A thing is said to be “in act” when it has fully realized its nature. The process that leads from potentiality to actuality is «actualization» (*energeia*).

Aristotle attaches two different meanings to this terminology of potentiality and actuality: in the first sense, potentiality is the ability to *acquire the capacity* to do something, and actuality corresponds to an aptitude once acquired, such as playing the violin. Anyone can learn to play the violin, given time and effort, and is thus a violinist “in potency” who may then become a violinist “in act” through learning and practice (actualization in the first sense). In contrast, the second meaning attached to this terminology refers to a situation of either being or not being in the process of doing what one has the capacity to do. A violinist is someone who has the ability to play the violin, but will not always be engaged in doing so; a violinist who is writing or reading remains a violinist “in act” in the first sense of the term (possessing the ability to play the violin), but in its second sense is a violinist only “in potency”, and not “in act” (since the ability is not currently being exercised). Here, actualization, that is to say becoming a violinist “in act” in the second sense of the term, involves picking up the violin and playing it.

So, in Aristotelian terms, that which exists in the mode of being of Heidegger’s *Fertigkeit* (the tool) always remains actualized in Aristotle’s first sense of the term, but may or may not be actualized in the second sense. The hammer that is no longer in use continues to be a hammer, continuing to actualize the power of hammering in the first sense of the term (i.e., in the sense that it still possesses this capacity to be used for hammering). However, a hammer that is not always in use will sometimes be a hammer “in potency” in the second sense of the term (not currently being used for hammering). On the other hand, that which exists in the mode of being of *Fähigkeit* (the organ) knows no distinction between potentiality and actuality, neither in the first nor in the second sense of these terms: the organ is always “in act”, in that it both possesses a capacity (Aristotle’s first meaning of the term), and is in the process of exercising it (the second meaning). For Heidegger, the organ that ceases to perform its function, unlike the hammer, does not revert from actuality to potentiality in the second sense of the term while at the same time remaining “in act” in the first sense of the term. The organ that ceases to perform its function simply ceases to be an organ. A heart that stops beating does not become a heart “in potency” in the second sense of the term. A heart that is not beating is no longer a heart at all.

The Italian philosopher Federico Leoni has shown that Heidegger’s analysis is not so much a critique of Aristotle as a critique of just one of the two Aristotelian conceptions of the living body, resulting from the importation of the concept of *organon* into biology (Leoni 2008). On the one hand, the analogy between organ and tool causes the organ to be seen as an individualized thing, separated from the process that formed it, and defined by its function alone – from this point of view, the organ effectively has the same mode of existence as the tool, “at the disposal” of the living being for the accomplishment of its biological functions, as if there were a distance between the living being and its organs. On the other hand, Aristotle also sees the organ as being inseparable from the process that generates it, i.e., the process of life itself. To live is to give rise to the appendages that we call “organs” that are needed to maintain the vital process itself (metabolizing food, reproducing, etc.). According to this perspective, organs are not external to the vital process: they are not “available”, separate and ready for use, like tools; they are immanent to the life process. As a result, an organ separated from the body ceases to be an organ. A severed hand, says Aristotle, is only a hand by homonymy.

Heidegger’s metaphysics course examines this second Aristotelian conception of life – life as a continuous process – and contrasts it with the first – life as the functioning of the organism, i.e., as the functioning of a whole composed of distinct parts, each dedicated to the performance of a specific function.

To sum up, to equate organs (and the body) with tools in the same sense as those used by the craftsman is, in Heidegger's view, to take a wrong path. Admittedly, Heidegger's analysis does not address head-on the problem of the "bifurcation", in modern technoscientific medicine, between the objective and the subjective, between the biological and the psychic or existential; that is to say, it does not directly answer the question raised by a failure to acknowledge the lived experience of transplant patients. The question that Heidegger's analysis answers is a different one, namely the question of how best to consider the essence of biological life. That said, other authors have referred specifically to Heidegger's metaphysics course when they call into question the "bifurcated" framework of transplant medicine. Leoni, for example, dismisses both the objectivist approach to organs, which could potentially lead to seeing them as mere commodities, and the bioethical approach, which stresses that the moral dignity of the person also falls to the body (as stipulated in the second of the bioethics laws passed in France in 1994): but he sees these two perspectives as complementary. Either we adopt the objectivist, functionalist stance of doctors and engineers; or we see our body as an "own body", the seat of our existential experiences, in which case we do not simply have our body as a set of organs "at our disposal", but we are our body, which has no existence separate from the very process of our life; our "own body" does not exist for us as a compound of parts, and we do not have organs, strictly speaking. The two camps reason from a shared premise, namely that organs only make sense as things possessing an identity independent of the process that gave rise to them, as tools endowed with functions and separate from a subject with which they do not converge. Svenaeus takes a similar line. He, too, takes his cue from Heideggerian analysis, contrasting on the one hand the concept of organs as tools and on the other a phenomenological approach inspired by Merleau-Ponty that centers on the lived body. The body is not a "complex of tools" that I have in my possession; I am my body.

But what happens to the Heideggerian analysis in the specific case where an explanted organ falls out of use without ceasing to be an organ altogether? A severed hand is clearly no longer a hand by homonymy alone, since hands can be transplanted: the severed hand can once again become a hand in use. Having been removed, the organ ceases to be an organ in act and becomes an organ in potency in Aristotle's second sense of the term, but it remains in act in the first sense of the term "act", i.e., it remains functional, it continues to possess in act the capacity to perform certain functions – which is precisely what enables it to be transplanted into a recipient and thus to once again pass from a situation of potency to actuality in the second sense, i.e., in the sense of the organ's actual use. The reality today is that organs can have the characteristics of a tool: they can be detached, recycled, transposed, "ready to use", at the disposal of the transplant surgeon and the patient. Does this mean they cease to be organs? Certainly not, since they can be transplanted and once again confer "*Fähigkeit*", i.e., the transplant patient's ability to use his or her body and organs to live. Heidegger could not have imagined this. At the turn of the 1920s-1930s, by the time he was giving his metaphysics course, almost no-one was transplanting organs any more: the difficulties caused by graft rejection were proving too great an obstacle. Transplantation was a therapeutic failure. Heidegger considered that it was a failure not only for biological reasons, but also for philosophical ones, arguing that an organ can never pass through the mode of being of the tool "ready to use" and then become an organ again, and that no possible technique could achieve this end. The mode of being of the tool (*Fertigkeit*) and that of the organ (*Fähigkeit*) are mutually exclusive. We now know that he was wrong: an organ can be explanted and made "ready to use", i.e., become a Heideggerian tool, and then become an organ again after transplantation. Between the mode of being of the organ and that of the tool there can be transitions – from organ to tool, then from tool to organ. This means that the use of a tool and the use of an organ are no longer as mutually exclusive as Heidegger claimed. Rather than making this binary distinction between organ and tool,

we need to place the organ on a continuum between the mode of being of *Fertigkeit* and that of *Fähigkeit*. It can undertake a journey from one to the other and back again. In the case of the deceased donor, the organ is no longer in use; it can be removed and made available to a patient (ready to use); transplantation, if successful, restores the organ to the mode of being of *Fähigkeit*, the organ in use; the graft can be rejected, it falls back out of use, but it can be retransplanted into a new patient and become the organ in use again, and so on.

As it makes this journey from *Fertigkeit* to *Fähigkeit* and back again, we may remark that the organ loses an essential characteristic of what it has in both the *Fertigkeit* and *Fähigkeit* modes: namely, the property of being forgotten. The “ready-to-use” tool, when put to work, is forgotten, becomes inconspicuous: it is eclipsed by the task at hand. It only becomes an apparent, even insistent, object when the activity is interrupted, which can happen for a number of reasons, as Heidegger described: because the tool cannot be found, because it is defective, and so on. As for the organ, provided that it is healthy, it is “silent”, according to Leriche’s famous definition: health is life in the silence of the organs. As long as it functions properly, Nancy’s heart does not appear, does not manifest itself: it only begins to exist as a heart when it starts to fail. And then, for Nancy, neither the graft nor the artificial organ let themselves be forgotten: their presence can even be so insistent as to occupy the whole mind. The American philosopher Drew Leder speaks of the «dys-appearance» of bodies and organs: they manifest themselves insistently in their very dysfunction (Leder 1990). The dialysis machine, which the patient with kidney failure needs to be hooked up to three times a week for several hours at a time, is neither like the Heideggerian tool nor like Leriche’s organ: it imposes its obvious presence. A technologized organ of this kind, between tool and native organ, is neither the one nor the other.

4. The two meanings of the “organ-instrument”

The analysis by Heidegger and his successors thus leads to a critical assessment of transplant medicine and its associated technologies. These analyses are more accurate than those that focus on the supposed Cartesianism of doctors and engineers in the field. On the one hand, as we have seen, it is wrong to regard Descartes as the tutelary figure of organ replacement medicine. On the other hand, the Cartesian body-machine metaphor has its virtues. David Wagner, for example, sees this metaphor as a salutary alternative to the agricultural metaphor of «organ harvesting», much more distressing in his eyes (Wagner 2013). By contrast, the Aristotelian conception of the body as composed of functional parts is undeniably that of doctors and engineers. Like Heidegger, Leoni and Svenaeus see this analogy between organs and tools as an unsatisfactory way of conceiving life and the body – a false analogy that may help to explain why patients with grafts or who are reliant on technological devices face so many difficulties in their daily lives. These difficulties are due not only to technical imperfections or to our imperfect mastery of organ functions and their interdependencies, but they have deeper philosophical causes, linked to the assimilation of organs to “available-to” and “ready-to-use” tools.

However, in the light of these considerations drawn from Heideggerian analysis, what becomes of Nancy’s testimony, which we have left in abeyance? What is to be made of his insistence on the significance of our realization, when organ failure and illness occur, that the body and the organ are instruments that can betray? And what are we to make of Descartes’ analysis in the sixth *Metaphysical Meditation*, whereby the body is a well-constructed instrument, as perfect as possible, but which in illness can prove to be a faulty instrument and do its job badly? Some may be tempted to see in these metaphysical considerations a confirmation of modern “bifurcated” thinking: on the one hand, there is the

body-object, the body-instrument that can malfunction, and on the other, the subject who has this body-instrument “at their disposal”, like a tool – a conception whose shortcomings have been pointed out by many, including Heidegger, Leoni and Svenaeus. However, Descartes is quite clear: I am not housed in my body like a pilot in his ship, i.e., I do not possess my body just as I might possess a tool that I could, if need be, discard in favor of another, as a craftsman may do with any of his tools. Descartes certainly introduces a conception of the body as an instrument, different from the concept of body-machine that he puts forward in his *Treatise on Man*, but this does not lead him to see the body as a tool of the same nature as a hammer or screwdriver. Unlike the craftsman, who keeps his tools at a distance, I have no distance from my own body-instrument: I am lodged within it. The same applies to Nancy. For him, discovering his body and his heart as faulty instruments does not mean discovering his body and his heart as tools.

In his metaphysics course, Heidegger did not link the notion of *Fähigkeit* to that of an instrument, because he considered an instrument and a tool to be equivalent. Descartes, however, in the *Sixth Meditation* (and also Nancy) conceives the body as an instrument of life that cannot be compared to a tool, since a tool, unlike our body-instrument, can always be replaced by another tool. Today, we certainly cannot replace our body-instrument, despite the claims of those delusional doctors who aspire to transplant heads onto bodies. On the other hand, it is possible today to change organ-instruments, and this involves these organs becoming tools (“ready to use”), and then, via transplantation, becoming instruments of life again, organs in use – although, in most cases, they do not become organs in their own right, that is to say forgotten by those to whom they belong. Beyond the false equivalence of organs with tools, Heideggerian *Fähigkeit* refers to the instrumentality of the body and the organs we use to live, with an instrument being seen as different from a tool.

If Heidegger had lived in our era of successful organ transplant and artificial organ engineering, he would probably have said, in view of the organ’s new mode of being, now defined as a continuum between *Fähigkeit* and *Fertigkeit*, that transplanters and engineers should no longer regard themselves as representatives of *Fertigkeit* alone, i.e., of organ design in terms of structure and function. Today, an engineer designing an organ replacement device is mainly, if not exclusively, focused on these aspects of structure and function. A transplant physician, on the other hand, evaluates the success of a transplant in terms of the resumption of organic functions (albumin synthesis for the liver, urine production for the kidney, etc.). If Heidegger were here today, he would no doubt point out what these manufacturers of the instruments of life are failing to recognize, namely that the organ is defined not only by its structure-function pairing (*Fertigkeit*), but also by its use (*Fähigkeit*). Thus, an organ replacement device can function very well and be “ready to use” for patient care (*Fertigkeit*), while being a very poor instrument of use, i.e., a very poor instrument of life (*Fähigkeit*). This is the case with the dialysis machine: dialysis is now a mature technology that performs the kidney’s function of filtering and detoxifying the blood very well. However, many patients experience it as a very poor instrument of life, given that their quality of life is no longer what it was: they can no longer do things that they used to do, they feel that their freedom is circumscribed, and so on. We may agree with Heidegger that the use we make of our bodies and organs should not be seen as a problem external to medicine and engineering, but that, on the contrary, doctors and engineers should treat the instrumentality of bodies, and not just their functionality, as a question of fundamental importance. An organ is not just a structure with functions; it is also, and above all, an instrument for living. This should be the primary concern of transplant doctors and engineers (Plough 1986; Fox & Swazey 1992).

The definition of the body as an instrument brings to mind Marcel Mauss’s famous text entitled *Les techniques du corps* (*Techniques of the Body* – Mauss 1973). The instrumentalist

conception of the body presented in that text was not, however, devised by Mauss himself. It can be found in Descartes, as we have seen, and before that in Aristotle, for whom the use of the body became a philosophical question as Agamben has shown (Agamben 2016). The conception of the body as an instrument has consequently accompanied the history of philosophical reflection on the body. In his text, Mauss revisits this long tradition, somewhat overshadowed by the 17th century emphasis on the body as a machine. But Mauss's analysis is directly political. Mauss argues that the body is, on the one hand, the means by which society inculcates its norms into individuals, through a process that Mauss does not hesitate to call the training of bodies. But at the same time, it is the body that enables us to disengage from these inculcated norms and instead to adopt other norms, other ways of behaving and other ways of doing things. It is because my body is an instrument to me that society can interfere in the handling of this instrument and impose norms on it, while at the same time I can always reappropriate the instrument and learn to use it differently.

Aristotle, for his part, had addressed the question of the use of the body in relation to the master's use of the slave's body, which he possesses as if it were part of his own body. The slave is defined in *Politics* as *organon pro organon*, that is to say, an instrument for an instrument. Aristotle uses the same expression, *organon pro organon*, to designate the hand. The slave, exactly like the hand, is a part of the body. However, the slave is not just any kind of instrument: in Aristotelian terminology, he is not primarily an «instrument of production» (*organon poietikon*), even though he can of course engage in productive activities; he is in essence an «instrument of use» (*organon praktikon*). He serves for «use» (*chresis*) before «production» (*poiesis*). Transplant medicine and the engineering of artificial organs seem to have lost sight of this sense of the organ as an instrument of use, retaining only the sense of the *organon poietikon*. It is an incomplete view that has far-reaching consequences, since it prevents us from considering that the dimension of use, of *praktikon*, could be consubstantial with a certain category of instruments to which, precisely, our organs belong.

Aristotle's discussion of the use of the body and its parts is therefore framed by a reflection on the slave and the slave's status as an *organon praktikon*. In other words, he is concerned with the private, not the public domain. As Agamben points out, Aristotle for a long time considered the use of the body to fall outside the sphere of politics. Mauss's text is absolutely crucial in that it encourages us to make the use of the body as an instrument a fundamental political and ethical question – a question relating to subjection and the processes of subjectification – with a bearing that goes beyond the private.

This is perhaps the major challenge facing transplant medicine and its associated technologies today: to raise to the level of an ethical and political question of the utmost importance the use we can make of the life-enhancing instruments that this technologized medicine places at our disposal.

5. Concluding remarks

In conclusion, I would like to offer some practical suggestions aimed at doctors, engineers and healthcare policy-makers.

First, doctors and engineers need to rethink the way they view the organ: not as a structure with a function; but as an instrument of life. To put it bluntly, the hemodialyzer effectively detoxifies the blood and enables patients in chronic renal failure to live long lives, but it is not an organ, not even an artificial organ. It is a blood detoxification machine, and not an artificial kidney. Going back to definitions of antiquity, there is the difference between *organon poietikon* and *organon praktikon*: on the one hand, the organ is defined by its functions, which are most often, though not always, functions of production – this point of

view guides the physician and the engineer; on the other hand, the organ is defined as a field of possibilities for the person whose organ it is, and who makes use of it. In other words, we need to stop mistaking the means (restoring organ functions) for the end (enabling patients to regain satisfactory use of their bodies). Of course, you cannot have one without the other – a liver that fails to detoxify or to produce albumin certainly cannot be a good instrument for use. However, it is not enough for a liver to detoxify, to produce albumin and, more generally, to perform all of its functions, for it to be *de facto* a good “organ” in the sense of a good instrument of use in everyday life.

Making this distinction between *organon poietikon* and *organon praktikon* can, however, lead to a serious misunderstanding: does it entail reviving a conception of the organ that distinguishes between means and ends – the restoration of functions on the one hand and the use of the body on the other? After all, doctors and engineers might perfectly well accept a definition of the organ in terms of the purpose of its use in daily life, and this is what they in fact do in their readiness to agree that their interventions need to enable patients to regain a “quality of life”, ideally the life that they enjoyed before they encountered organ failure and disease. This implies that their role involves restoring organ function, i.e., establishing conditions that will enable the organ to return to use. In the event of difficulties in living with their new “instrument”, after the intervention of the doctor and engineer, the patient might then turn to other specialties, calling on other realms of expertise: those of the psychologist or social worker. Here, the various specialists are each confined to their own domain, and the “bifurcated” conception of the organ remains intact, with a distinction between the organ as a support for the biological functions necessary for life, and the organ as a support for a life plan, an existential instrument.

Against this return to a “bifurcated” definition of the organ, Heidegger’s analysis has the great merit of making it clear that the dimension of use is an integral part of the biological definition of an organ, not external to it: there is no distinction of registers, but rather a continuum that goes from the organ as a provider of functions (*Fertigkeit*) to the organ in use (*Fähigkeit*), and back again. In other words, taking into account the dimension of organ use, and not only organ functions, is a responsibility that belongs to the doctor and engineer, and not only to those other professionals whose job is to help patients return to “normal life”. If we do not follow Heidegger in assimilating the instrument to a craftsman’s tool, it is possible to see in the concept of *Fähigkeit* a conception of the biological organ as an instrument: an instrument of use inseparable from the very process of its use, and not a tool detachable from the use made of it.

Thus, doctors and engineers are justified in considering the organ as an instrument; their mistake is to take too narrow a view of the notion of instrument. The transplanted graft is an instrument, and the artificial organ is an instrument, but they are instruments of use, not tools of production. There is undoubtedly a need to educate doctors and engineers (especially those in training) to broaden their conception of the organ-instrument.

My second suggestion concerns the expression “return to normal life”, often used to describe the post-transplant period. The objective is that patients return to a “normal life”, i.e., resume the activities they used to engage in, and more generally the most basic activities of daily life. This expression translates into everyday language the Heideggerian concept of *Fähigkeit*, in the sense of the use that each person can make of his or her organs-instruments, in the daily routine of life. This idea of a “return to normal life”, i.e., to the life enjoyed before organ failure, seems consistent with the definition of the organ as a continuum between tool (*Fertigkeit*) and instrument of use (*Fähigkeit*). Continuum, however, does not mean continuity. If returning to “normal life” means transforming a tool (the graft or artificial organ designed by engineers) into an instrument of use, then this return implies invention, re-elaboration – in other words, it is not really a return to the starting point, to life as it was before. Patients have to reinvent a body and a use for their body; they have to

learn to inhabit a new field of possibilities. The dominant discourse remains centred on the notion of “substitution”: a new organ or artificial device has been “substituted” for the failing organ, suggesting that this new organ or device will do exactly the same thing as the original one. Difficulties can arise, linked for example to immunosuppressive treatments, or to a stigmatization of transplant patients that prevents them returning to employment. However, these difficulties are seen as obstacles along a path which ultimately returns patients to lives identical to those they led previously. But this is not what happens in practice. Rather than “substituting”, it is better to speak of “supplementing”, in the sense that patients will have to deal with an organ-instrument that will not enable them to return to their previous lives in an identical way: they will have to reinvent themselves, to find new ways of living, new ways of using their bodies. Rather than invoking a “return to normal life”, it is better to heed Georges Canguilhem’s observation that after illness there is never a return to the starting point, but instead there is an adoption of new norms of life. What is “normal” for the patient is not to return to what he or she was before, but to reinvent a life in line with new possibilities for using the body.

My third suggestion concerns the regulation of organ replacement medicine as a field of research and innovation. At the end of his lecture on imagination and invention (Simondon 2017), Simondon argued that society needs regulation, but a different kind of regulation than regulation in the technical domain. To understand what is at stake here, we need to go back to the importance of cybernetics for Simondon (and for some of his contemporaries, notably Canguilhem). Norbert Wiener had, albeit very cautiously, considered how cybernetics might be harnessed in the government of societies. Could human societies be organized and governed on a cybernetic basis, via the principles of homeostasis and feedback? Simondon countered this suggestion, pointing to where cyberneticists were mistaken in this respect: not in their wish to transpose their science to society, but in their unwarranted faith in a certain type of technical being, the *automaton*, which served as their model for all self-regulating systems, including societies. For cyberneticists, the question was whether society could be considered a kind of *automaton*, with self-regulating mechanisms and homeostasis. Simondon’s answer, like Canguilhem’s, was no. However, Simondon also argued that a better understanding of cybernetics – not the science of *automata*, but the science of operations in being – should be able to provide general principles for the organization and government of societies. The psychosocial domain, like the other domains of being (the living domain and the technical domain), is also governed by operations. A general science of operations within being, or general cybernetics, or allagmatics in Simondon’s terms, can thus have a political relevance, insofar as political and social problems are nothing other than problems concerning operations in a specific domain of being (here, the psychosocial domain).

Simondon’s lecture on imagination and invention concludes with a decisive statement: human societies are shaped by affective-emotional processes that are in fact not operative in nature. Since these processes are not operations, they do not fall within the scope of a science of operations in being. Images play an essential role in the study of societies, precisely insofar as they provide access to this non-operational, affective-emotive stuff of which societies are made.

If we accept Simondon’s premise, then the practices of transplant medicine and organ engineering that give rise to different “imaginaries” of the body – the body-machine, the animist body, the cyborgian body, the “*excrit*” body, the body-instrument – take us beyond simple problems of regulation when we attempt to address “body-political” issues. That is to say, transplant medicine and organ engineering raise questions that do not relate solely to the types of control that need to be placed on new scientific and technological developments. Regulation has become the motto of the politics of technoscience: science and tech-

nology must be regulated, framed by laws and standards of all kinds – in other words, procedures and legal-ethical operations must be established in order to contain technoscientific hubris. But the affective-emotional dimension of technoscience cannot be circumscribed by procedures. A doctor or an engineer can scrupulously respect procedures, established rules and professional ethics, but still ignore the feelings of patients and the question of how they will use their transplanted body. The ethics and politics of organ transplant cannot be limited to the implementation of control operations, but they call for a public expression of the body's "imaginaries" (and not just a private expression in the psychotherapist's office). There needs to be far greater awareness of the affective-emotional impact of having to live with someone else's organs, or with an artificial organ.

Bibliography

- Agamben, G. (2016). *The Use of Bodies*. Engl. Trans. A. Kotsko. Redwood City: Stanford University Press.
- Ben-David, O. B. (2005). *Organ Donation and Transplantation. Body Organs as an Exchangeable Socio-Cultural Resource*. Westport: Praeger Publishers.
- Bergson, H. (1944). *Creative Evolution*. Engl. Trans. A. Mitchell. New York: Random House Inc.
- Byl, S. (1971). Note sur la polysémie d'Ὀργάνον et les origines du finalisme. *L'Antiquité classique*, 40 (1), 121-133.
- Carrel, A. (1939). *Man the Unknown*. New York and London: Harper & Brothers.
- Carter, B. et al. (2024). Personality Changes Associated with Organ Transplants. *Transplantology*, 5 (1), 12-26 (<https://doi.org/10.3390/transplantology5010002>).
- Descartes, R. (1999). *Meditations and Other Metaphysical Writings*. Engl. Trans. D. M. Clark. London: Penguin Classics.
- Descola, P. (2014). *Beyond Nature and Culture*. Engl Trans. J. Lloyd. Chicago: University of Chicago Press.
- Fox, R. C. et al. (1992). *Spare Parts. Organ Replacement in American Society*. Oxford, UK: Oxford University Press.
- Friedman, D. M. (2007). *The Immortalists. Charles Lindbergh, Dr. Alexis Carrel, and Their Daring Quest to Live Forever*. New York: ECCO-HaperCollins
- Hacking, I. (2005). The Cartesian Vision Fulfilled: Analogue Bodies and Digital Minds. *Interdisciplinary Science Review*, 30 (2), 153-167.
- Hacking, I. (2006). The Cartesian Body. *Biosocieties*, 1, 13-15 (<https://doi.org/10.1017/S1745855205050064>).
- Haraway, D. (2006). A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late 20th Century. In J. Weiss et al. (eds). *The International Handbook of Virtual Learning Environments* (117-158). Dordrecht: Springer.
- Heidegger, M. (1995). *The Fundamental Concepts of Metaphysics: World, Finitude, Solitude*. Engl. Trans. W. McNeill & N. Walker. Bloomington: Indiana University Press.
- Le Breton, D. (1994). Dissecting Grafts: The Anthropology of the Medical Uses of the Human Body. *Diogenes*, 42 (167), 95-111 (<https://doi.org/10.1177/039219219404216706>).
- Leder, D. (1990). *The Absent Body*. Chicago: University of Chicago Press.
- Leder, D. (1992). A Tale of Two Bodies: The Cartesian Corpse and the Lived Body. In D. Leder (ed). *The Body in Medical Thought and Practice (Philosophy and Medicine vol. 43)* (17-36). Dordrecht: Springer.
- Leder, D. (2002). Whose Body? What Body? The Metaphysics of Organ Transplantation. In M. J. Cherry (ed). *Persons and Their Bodies. Rights, Responsibilities, Relationships (Philosophy and Medicine vol. 60)* (233-264). Dordrecht: Springer.

- Leister, M. B. (2020). Personality Changes Following Heart Transplantation: The Role of Cellular Memory. *Medical Hypothesis*, 135, Article ID: 109468 (<https://doi.org/10.1016/j.mehy.2019.109468>).
- Leoni, F. (2008). *Habeas Corpus. Sei genealogie del corpo occidentale*. Milano: Mondadori.
- Lock, M. (2002). Human Body Parts as Therapeutic Tools: Contradictory Discourses and Transformed Subjectivities. *Qualitative Health Research*, 12 (10), 1406-1418 (<https://doi.org/10.1177/1049732302238751>).
- Mandressi, R. (2003). *Le Regard de l'anatomiste. Dissections et invention du corps en Occident*. Paris: Éditions du Seuil.
- Mauss, M. (1973). Techniques of the Body. *Economy and Society*, 2 (1), 70-88.
- Merleau-Ponty M. (2003). *Nature. Course notes from the Collège de France*. Engl. Trans. R. Vallier. Evanston: Northwestern University Press.
- Mol, A. (2003). *The Body Multiple. Ontology in Medical Practice*. Durham: Duke University Press.
- Morizot, B. (2014). La greffe d'organes révélatrice de schèmes ontologiques. L'éthique médicale au prisme de l'anthropologie de Philippe Descola. *Cahiers de philosophie de l'Université de Caen*, 51, 89-106.
- Nancy, J.-L. (1992). *Corpus*. Paris: Métailié.
- Nancy, J.-L. (2002). L'Intrus, *CR: The New Centennial Review*, 2 (3), 1-14 (<https://doi.org/10.1353/ncr.2002.0052>).
- Nancy, J.-L. & Andrieu, B. (2011). Entretien avec Jean-Luc Nancy. *Corps* 2011/1, 9, 49-55
- Pearsall, P. et al. (2002). Changes in Heart Recipient Transplants that Parallel the Personalities of their Donors. *Journal of Near-Death Studies*, 20 (3), 191-206.
- Plough, A. L. (1986). *Borrowed Time: Artificial Organs and the Politics of Extending Lives*. Philadelphia: Temple University Press.
- Schicktanz, S. et al. (2017). The Utterable and Unutterable. Anthropological Meaning of the Body in the Context of Organ Transplantation. *Dilemata*, 23, 107-127.
- Schlich, T. (2013). *The Origins of Organ Transplantation: Surgery and Laboratory Science, 1880-1930*. Rochester, NY: University of Rochester Press.
- Schweda, M. et al. (2009). The "Spare Parts Person"? Conceptions of the Human Body and Their Implications for Public Attitudes towards Organ Donation and Organ Sale. *Philosophy, Ethics, and Humanities in Medicine*, 4 (4) (<https://doi.org/10.1186/1747-5341-4-4>).
- Sharp, L. (1995). Organ Transplantation as a Transformative Experience: Anthropological Insights into the Restructuring of the Self. *Medical Anthropology Quarterly* 9 (3), 357-389 (<https://doi.org/10.1525/maq.1995.9.3.02a00050>).
- Sharp, L. (2006). *Strange Harvest. Organ Transplants, Denatured Bodies and the Transformed Self*. Berkeley and Los Angeles: University of California Press
- Sharp, L. (2014). *The Transplant Imaginary. Mechanical Hearts, Animal Parts, and Moral Thinking in Highly Experimental Science*. Berkeley and Los Angeles: University of California Press.
- Silvia, C. (1997). *A Change of Heart: A Memoir*. New York: Little Brown and Company.
- Simondon, G. (2017). *On the Mode of Existence of Technical Objects*. Engl. Trans. C. Malaspina & J. Rogove. Minneapolis, MN: University of Minnesota Press.
- Simondon, G. (2014a). *Imagination et invention (1965-1966)*. Paris: Presses Universitaires de France.
- Simondon, G. (2014b). *Sur la technique (1953-1983)*. Paris: Presses Universitaires de France.
- Solhdju, K. (2020). Corps animés et âmes corporelles: apprivoiser les expériences des transplantations d'organes, *Corps*, 1 (18), 143-152 (<https://doi.org/10.3917/corp1.018.0143>).

Svenaesus, F. (2010a). The Body as Gift, Resource of Commodity? Heidegger and the Ethics of Organ Transplantation. *Bioethical Inquiry*, 7, 163-172 (<https://doi.org/10.1007/s11673-010-9222-x>).

Svenaesus, F. (2010b). What Is an Organ? Heidegger and the Phenomenology of Organ Transplantation. *Theor Med Bioeth*, 31, 179-196 (<https://doi.org/10.1007/s11017-010-9144-y>).

Svenaesus, F. (2012). Organ Transplantation and Personal Identity: How Does Loss and Changes of Organs Affect the Self? *Journal of Medicine and Philosophy*, 37, 139-158 (<https://doi.org/10.1093/jmp/jhs011>).

Wagner, D. (2013). *Leben*. Hamburg: Rowohlt.

Whitehead, A. N. (1920). *The Concept of Nature*. Cambridge: Cambridge University Press.

Augmented Imagination Thinking Technology Beyond Extension¹

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Abstract. *This article seeks to unravel the relationship between technicity and imagination, asking whether the latter can be extended by technologies or whether it risks being desensitised by its contact with technical prostheses. Augmented Reality (AR) will provide an emblematic case study to showing how the activity of imagination is not merely extended through technological devices, but is rather a material process that occurs when we are actively engaged in the manipulation and exploration of the world. The analysis of AR will then allow us to put to the test the theoretical model of extension that has dominated reflection within the philosophy of technology over the last two centuries. Maintaining that technical behaviour does not precede the manipulation of objects, but rather emerges from our encounter with sensible matter, the article will argue that imagination is always already externalized, always “outside” of us, as it is constantly reconfigured in the relationship with the environment and especially with technologies and media.*

Keywords. augmented reality (AR), imagination, technology, extension, incorporation.

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1. Shaped by things

The co-implication of technology and imagination was captured by the most famous scene of the film *2001: A Space Odyssey* by Stanley Kubrick (1968), in the critical prologue sequence *Dawn of Man*, in which, following the apparition of the monolith, a humanoid ape, representing a distant ancestor of our species, discovers that they can make a weapon from the bone of an animal carcass. One of the most iconic moments in film history encapsulating the birth of technology and culture, this sequence is often interpreted as an emblem of a – historically unlocalizable – turning point in the development of human evolution. Re-enacting the mythical moment of humanity's first use of a technical tool, Kubrick's film seems to suggest that the roots of civilization are entangled with the shadow of violence, but, at the same time, that technicity is something that inherently belongs to human life, that the possibility of being extended or augmented through technology should be deemed an intrinsic feature or even the specific trait *par excellence* of humanity. Humans are thus to be defined by their ability to manipulate their environment, to turn things into an amplification of their body and will, developing the idea that, to put it in the words of Bernard Stiegler, a «prosthesis is not a mere extension of the human body; it is the constitution of this body *qua* "human"» (Stiegler 1998, 152).

However, it is rarely emphasized how this famous sequence also underscores the fact that the transformation of a mere thing – the bone as the inert remains of a living creature – into a technical object with a purpose-oriented function is driven by an imaginative interplay. When the humanoid ape first wields the bone as a tool, they do not direct their newfound competence immediately against the herbivores that populate their environment, or, as they will later do, against one of the members of a rival tribe. Instead, the femur taken from the skeleton crashes down on the inanimate carcass that lies in front of them: an action that should by no means be taken as a consequence of their bestial nature, since no animal would attack a corpse – for what would be the purpose of beating inert matter? You cannot kill what is already dead. Hence, the first use of what is presented as the primordial appearance of a technical tool is introduced not through the *direct* application of its functions, but, we might say, through a fictive enactment. Technical behaviour does not precede the manipulation of the bone-as-object, it is rather the encounter with the object, and the gestures that activate it, which allows the emergence of technicity as a possibility offered by matter itself. In other words, it is the object itself, used as a *prop* in a make-believe (Walton 1990), that provides cues and serves as a prompt for imagination, so that the humanoid ape can engage creatively with their surroundings and eventually turn the fictive performance into technical behaviour.

The activation of the affordances of the bone-as-tool happens through a mimetic, non-utilitarian, and explosive gesture of energy release. In the sequence this is emphasized visually by the use of slow motion, highlighting the decisive and sacral nature of this augural gesture, as much as its gratuitous character, the expenditure of force and the movement of *dépense*, that it entails. Thus, what happens is that a fragment is appropriated from physical and continuous space and comes to embed a virtual dimension, thereby operating a transmutation of the sensible into an operational-imaginative chain. To reframe this in Ellen Dissanayake's terms, we could see technicity as a form of «making special», a process of ritualisation that transforms ordinary experience, changing its symbolic meaning and redefining the materiality of things (Dissanayake 2001).

This primaeval scene of technicity is initiated with a figurative action, a mime, which is both an index of the work of imagination which is afoot and an invitation to such imagination. It is only in the space opened by mimicking the action of killing, that our ancestor discovers their capacity for manipulation, and, hence, their dominance over other beings and eventually over their own kind. Technicity stems from such imaginative

operationality: if the bone is no longer *just* a bone, but can be also seen as a tool, then by metonymy even the inert carcass of the animal can signify something other than itself – the living animal, the prey. It is the non-purpose-oriented doing, the process of the ape toying with the remains of the dead animal, which progressively transforms into an oriented action, precisely *by miming* the destructive technical action to come.

If the human body can endow itself with technical skills and tools capable of increasing the range of its action on the environment and mediating its relationship with other objects and beings, this capacity for technological augmentation relies on an ability to project itself virtually beyond its limits, that is to engage in virtual actions. «My body is wherever there is something to be done», wrote Maurice Merleau-Ponty in a famous passage of *Phenomenology of Perception* (Merleau-Ponty 2005, 291), to single out the distinctive feature that makes human beings able to «orient themselves towards the possible, the mediated» (Merleau-Ponty 1963, 176), and to project themselves into the future and the past, constantly transcending their goals.

We might also call imagination this capacity of the body to systematically overcome its possibilities (Montani 2014, 33) and its tendency to virtually project itself in time and space, which guides human behaviour. We could then argue that technicity, driven by this ability proper to the human body of relating virtually with the world, stems from imagination itself: it comes into being as an effect of an imaginative interaction, as a product of the play of imagination.

In this perspective, technicity and imagination converge and are mutually interconnected: as much as imagination “secretes” technical action, technicity activates imaginative potentials. Technicity in its primordial appearance can be radically reframed as the capacity to manipulate things by revealing in them unprecedented affordances, while imagination can be understood as the very foundation of our capability to “hijack” or “hack into” sensible matter so as to make it become something else. Thus, technology and imagination seem to be constitutively intertwined. Yet, describing their interaction is far from simple.

2. Questioning the extension theory of technology

Understanding technicity in its constitutive intertwining with imagination would allow us to partially put into question the theoretical model by means of which philosophers and theorists have traditionally framed the relationship between human beings and technology: the paradigm of extension (Brey 2000; Steinert 2016), namely the idea that technology is an externalization or prosthetic expansion of human capacities, enabling individuals to transcend their biological and physical limitations, thus enabling new ways of interacting with the world and having an impact on human embodied experience. In the philosophy of technology, the paradigm of extension has been articulated in accordance with a two-way movement: extension shall not simply be thought of as an amplification of human capacities, but as a more complex dynamic that is articulated as a dual complementary trajectory of both extension and incorporation.

On the one hand, we can observe that technical objects result from a process of externalization of bodily functions that are projected by the human being into the environment. This perspective was first introduced by Ernst Kapp at the end of the 19th century (Kapp 2018), suggesting that every tool could be understood as an exosomatic organ, namely as the «projection of an anatomic organ [*Organsprojektion*]». It is in the light of this projective movement that André Leroi-Gourhan described the development of technological behaviour in *homo sapiens*. However, for the French anthropologist and palaeontologist, no essential distinction could be drawn between the tool as a technical

“organ” and the bodily organ as a biological element: a technical instrument, such as a stone tool, emerges from sensible matter in the same way as the hand, insofar as they both are a «secretion of the body and the brain» (Leroi-Gourhan 1964, 132). In so doing, Leroi-Gourhan implicitly establishes a fundamental continuity between the organic and the inorganic, between our living body and its technical prostheses, inseparable from the development and historical evolution of the living body.

In their relationship with human sensibility, things cease to be mere objects and become instead «quasi-organs», contributing to our being open to the world and constituting an «extension of existence» (Merleau-Ponty 2005, 135). The paradigm of extension dominated reflection around technology during the 20th century, culminating in the work of Marshall McLuhan, who defined media as extensions of the human (McLuhan 1964). But, since every technical object affects and modifies the human sensorium and its cognitive capabilities, the media theorist also highlighted how the amplification deriving from the movement of extension in the environment always entails a form of mutilation, a self-amputation (McLuhan 1964, 42), since at the very moment in which the possibilities of individuals are extended, they are simultaneously affected by the specific dynamics imposed by the medium.

In fact, as long as it mediates our relationship with the world and others, any tool, device, or interface inevitably selects, amplifies, or reduces in various ways aspects of our experience (Ihde 1979, 1990) and also comes to filter our engagement with the world. By mediating our encounter with the world and with others, technologies alter the conditions of perception and thought, as they come to modify the prevailing structures of experience; hence, they can have an impact on our faculties. In the wake of McLuhan’s work, Derrick de Kerckhove suggested that electronic media have come to extend not only our bodies and our nervous system, but also our psychology, acting as «psycho-technologies» (de Kerckhove 2014), in that they reproduce and amplify the powers of the human mind, an idea already anticipated by the psychologist Hugo Münsterberg with regard to the cinematic apparatus (Münsterberg 2013).

Conversely, on the other hand, if the human body extends itself into the environment through its instruments, it will also end up incorporating these mediations into its body schema and behaviour; such extensions and practices will become part and parcel of its way of engaging with the world and others. The movement of externalization then implies a parallel process of internalization or interiorization (Hall 1976), the two to be interpreted as complementary theoretical models on which hinges our interaction with the environment.

Through his account of corporeality, Merleau-Ponty provided an implicit phenomenology of instrumentation (Ihde 1990, 40), showing how the centrifugal movement of extension, that is the body’s capacity of «dilating our being-in-the-world» and «changing our existence by appropriating instruments» (Merleau-Ponty 2005, 127), is always coupled with a centripetal movement of incorporation, since, through habit, our body has the power to include objects within its system of virtual action, and to embed its projections by incorporating elements of the environment. As in the classic example of the cane, which extends the range of action and perception of the blind person using it and, at the same time, is no longer perceived as a separate entity: it ceases to be an object and is incorporated as if it were an area of sensitivity (Merleau-Ponty 2005, 165).

Each new tool elicits a – more or less accelerated – process of adaptation of the body and its possibilities; that is, technologies come to reorganise our sensorium and reconfigure our cognitive and relational behaviour. In the terms of Vilém Flusser, we can say that every extension of the body resulting in a prosthesis also implies an *epithesis* (Flusser 2014, 165) as its reverse movement: that is, when the tool becomes an extension of my arm or the pen that of my finger, inversely my organs need to rearrange and modify themselves to adapt

to the new affordances that are ushered in. After having shaped an instrument, human beings will also have to reshape themselves around it, to adjust themselves to technology by supporting it with their gestures and attitudes, both from a bodily and cognitive, as well as a cultural and intellectual point of view.

Given this two-fold dynamic, we can now consider whether the paradigm of extension and incorporation could apply to the relationship between technology and imagination. First, we will explore to what extent imagination can be augmented or enhanced through technologies, understood in the broad sense as including the «techniques of the body» (Mauss 2006). This would eventually allow us to assess whether the extension theories of technology hold true, when questioned through an account of the co-implication of technicity and imagination. If imagination lies at the core of the development of technicity, driving the processes of virtual projection and introjection, could the capacities of imagination, in turn, be extended and externalized through technology? How do technologies produce an amplification of the powers of imagination?

If imagination can indeed be extended, would this imply the existence of something like an inner imaginative faculty – which can be externalized? We may wonder, is this the case? If, drawing from our analysis of Kubrick's famous sequence, technical behaviour seems to emerge as a by-product of the body's ability to interact virtually with the material world – picking up cues and engaging with the affordances embedded within it – how should we account for the imagination outside of us?

The coupling between bodies and technologies has never been as evident as in recent years, by virtue of the widespread diffusion of portable and wearable devices that act like as many forms of augmentation of our embodied engagement with the environment. Today virtual-, augmented- and mixed-reality technologies come to challenge once more this complex dynamic. How is imagination reconfigured in the relationship with these technologies? And what can these media practices teach us about the way imagination might be extended and reshaped by its interaction with technology? Through an analysis of the contemporary mediascape, we will then ultimately consider how the possibility of augmenting imagination through technologies can reveal something of the inherent structures of technicity itself. By investigating the possibility of augmenting and externalizing imaginative operationality, we will seek to argue that this account of technicity in its relationship with imagination could supersede or at least provide a deeper understanding of the movement of extension commonly used to describe technological augmentation.

3. The creation of an epistemic space

In an article published in 1994, David Kirsh and Paul Maglio introduced the concept of «epistemic action», namely an action performed for the purpose of more fluent reasoning. According to the two authors, such actions, which at least in theory can be distinguished from “pragmatic” and merely executive actions, are used to reveal information in the environment in order to improve the ease, speed and reliability of one's reasoning. For example, tying a knot in a handkerchief is not the ultimate goal of the action of tying a piece of cloth: it serves to make a note of something I want to remember. Epistemic actions can thus refine problem-solving tasks because they reduce the memory required for the computational task at hand (or space complexity) as well as the number of steps needed (or time complexity), thereby reducing the likelihood of making mistakes (Kirsh & Maglio 1994, 513-514). Kirsh and Maglio take the famous video game Tetris as an example, because it is easy to learn, even in a short time, and because it allows for a significantly reduced number of possible actions (rotation, translation, release). Specifically, the two

authors observe an improvement in speed and efficiency in the choices made by players who actually manoeuvre external objects, compared to those who only use cerebral resources. In short, trying out different possible rotations of the famous coloured polygons is not only useful for actually placing them, but also, and above all, for assessing where and how to position them before they are set down. Of course, this does not mean that epistemic actions cannot be unsuccessful: it may happen that I have absolutely no recollection of why I tied a knot in my handkerchief. Moreover, in most cases, actions cannot be strictly divided into those that have an exquisitely pragmatic purpose and others that are performed simply to improve one's computational performance: several everyday actions have both a pragmatic and an epistemic purpose.

Crucially, however, Kirsh and Maglio's contribution was the first to provide experimental evidence that involving the body and interacting with objects in a mental process can significantly improve reasoning outcomes.

For this to be possible, then, it must be admitted that some cognitive resources lie outside the boundaries of the human individual's body. In other words, human beings do not simply virtually project their cognitive activity outside their bodies: the body in action and the exchange with matter are genuine (and therefore active) mental resources for themselves. Recently, Maria Danae Koukouti and Lambros Malafouris have suggested that the study of imagination should also be reconsidered from this perspective, describing it as a material process resulting from the interaction between the brain, the body and the environment (Koukouti & Malafouris 2020). The two authors take the case of clay as an example: no artisan, however skilled, can simply impose a predetermined idea onto the material. Instead, the object that is actually produced is the consequence of the artisan's relationship with the clay in a specific event.

In a way, every technical manipulation re-enacts the circumstances of the *primaeva* technological gesture shown in *The Dawn of Man* sequence. As much as the material responds to every human stimulus, the matter in turn imposes impulses and opens up at least partially unforeseen directions of work. While there is certainly a *savoir faire* that is acquired through repetition and that allows a project to be worked out in advance, it is not reducible to the activation of a neural pattern, but is rather developed thanks to a physical habit built up through a series of movements performed at a specific rhythm and imprinted in muscle memory (Koukouti & Malafouris 2020, 42). Imagination cannot therefore be considered as an exclusively individual, internal and private faculty, nor as an activity carried out independently of things: rather, it is a phenomenon that occurs when all these components come together and whose course changes depending on the matter with which we come into contact. In this sense, according to Koukouti and Malafouris, imagining is a material process that manifests itself when we are involved in the manipulation and bodily exploration of the world, and they therefore describe it as the glue that holds together the various parts of the environment, mediating and modulating their collaboration. Indeed, there is not much we can imagine outside of the synergistic exchange between the brain, the body and the environment (Koukouti & Malafouris 2020, 42).

Since the 1960s cinema and other media have been an area of bitter contestation, amid fears of the autonomy of machines and the alienation of human beings from their capacities, now externalized in technical devices (Grespi 2019, 73). These fears take on the aforementioned McLuhan's idea that technology determines an empowerment of the human being by delegating some of their capacities to a technical tool. As a matter of fact, the so-called "new media" came to be seen as threatening, as having the potential to diminish the human imagination (Grespi 2019, 73).

However, in the light of theories such as those of Kirsh and Maglio or Koukouti and Malafouris, it does not seem possible to speak of a technical externalization of certain internal capacities, since creative thinking has always been, at least in part, outside us,

“naturally” predisposed to branch out into practices and objects. “Externalization” and “internalization”, “extension” and “incorporation” are terms that prove inadequate for expressing the complexity of our relationship with material culture, since they propose a dynamic based on a rigid distinction between inert objects and a conscious human agent, who gives and loses, suffers additions or impairments, but ultimately directs and guides the exchange. On the contrary, internal and external resources are equally decisive in the constitution of the mind, and in particular of creative thought, the harmony of which is also made up of frictions, resistances and rigidities, but not of open conflict or total alienation.

In fact, we can affirm that becoming distributed among technical devices is the necessary condition for a living being to be able to imagine: objects serve as material cues for manipulation and ultimately orient the imaginative process as much as we do. In short, we needed the humanoid ape and the bone to engage in a reciprocal alignment of gestures for the technical imagination to emerge.

4. Innervated bodies

If we consider the contemporary mediascape, a phenomenon which is the contrary to externalization seems to be taking place. Thus, the attention of the largest technology companies is now converging on bodily movement and gesture.

In this respect, it is particularly pertinent to consider portable or wearable technologies, referred to as augmented reality (AR). From its origins, AR has been conceived as a way of integrating, modifying and enhancing the real environment, without replacing it, but adding electronic potentialities to the affordances already present in it (Wellner, Mackay & Gold 1993). The term first appeared to describe a prototype of a visor designed to speed up aircraft assembly workers by allowing them to see the instructions necessary to carry out a task in their field of vision, while still working: by reducing the time needed to retrieve information, AR was expected to improve productivity and enhance workers’ performance (Caudell & Mizell 1992).

From that point onwards, smart glasses represented the ideal endpoint for AR technologies. Google developed Glass, a smart head-mounted monocle display, which was nevertheless withdrawn from the market in 2015, just one year after its launch (Eugeni 2021, 19-21). Similarly, Microsoft has recently announced that production of HoloLens, the most widely used smart glasses in the field to date, will cease in 2027 (Warren, 2024). Apple attempted to enter the market with the Vision Pro, a visor that was regarded as a prospective future leader in spatial computing. Nevertheless, the production of this device is also scheduled to end in 2025 (Barbera, 2024). Meanwhile Apple has already begun the development of models of wearable technology designed for general everyday use and home accessories capable of projecting responsive images (Verplaetse & Della Silva, 2023), and Meta has unveiled Orion, a prototype of smart glasses that it intends to launch on the market in the next few years (Meta 2024).

Due to technical limitations that are apparently slowing down the production of smart glasses, AR is currently mainly disseminated through portable devices such as smartphones or tablets and can therefore be defined more generally as a form of reality integration thanks to the addition of digital entities to the subject’s perceptual environment. This then covers all technologies that involve the superimposition of digital elements on the field of vision, from mobile phones to visors to smart glasses.

On the other hand, why is it that, despite the obvious difficulties, smart glasses continue to attract the investments and energies of the major computer manufacturers? It is because, by literally grafting themselves onto the individual, they would allow most of the tools we use today to be integrated into humanity’s earliest and most fundamental tool,

the body, turning it into the ideal computer. The goal with AR is therefore to realise devices for the so-called “naturalisation” of the technological experience: that is, they must provide an interface with which we can interact with sight, voice and gesture as we would with any concrete object in the world (Williams, Garcia & Ortega 2020). When engaging with them, the user manipulates responsive but intangible objects, for instance, documents, photos, videos, shared projects, works of art, and even distant individuals appearing in the form of avatars.

So, consciously or not, the creators of AR technologies, both portable and wearable, seem to have incorporated into their design the idea that a body in motion is a body that thinks, and that the mind is made up of objects, movements and space rather than solely of internal faculties. In fact, AR at least integrates rotation, oscillation and movement in different directions: when we use a tablet or a mobile phone to “reveal” objects and digital information in the environment, in addition to moving our hands, as we are used to doing with touch technologies, we also have to mobilize both the device and ourselves in space.

In some cases, organs such as the skin become full-fledged components of digital and networked technologies. The prismatic lens of Google Glass Enterprise Edition 2 used to redirect the light beam produced by the device directly onto the retina; to open the menu screen while wearing HoloLens 2, users must raise their left arm in front of their field of vision and click on the Microsoft icon that appears on the inner surface of the wrist. Apple Vision Pro is equipped with a machine learning system that scans the wearer’s face to create an avatar that is as close to the wearer’s appearance as possible, which promises to preserve the wearer’s personality even in virtual interactions. The scanning process is also used in the pre-purchase phase to ensure that the wearer’s fit is as comfortable as possible. Those parts of us that literally offer themselves as a support seem to constitute the solution to continuity between human and non-human, animate and inanimate, a border where the distinction fades and blurs, so that a momentary integration between living body and technological body occurs (Carbone & Lingua 2023, 145).

Eyes, hands, skin are thus incorporated as hardware elements of the device, together with the complex of bodily movements and behaviours that are fundamental to its functioning. The movement of the whole body, including the eyes and voice, assumes the character of taking grip. With HoloLens 2, for example, in addition to the voice commands now available on most devices, I can move screens by rotating my head, activate functions by staring at them, and select and modify the size and properties of the elements that appear with a pincer movement made by thumb and forefinger.

The basis of the operation of wearable AR, even when experienced by means of handheld devices, is first and foremost eye-hand coordination. More specifically, it allows the eye and hand to swap roles: the eye can finally touch as if it were meeting a surface; the hand alters things from a distance as if it were seeing them. The hand feels through space and time; it no longer compromises itself because it touches, without taking hold of, objects that have an ephemeral character. The renewed “augmented” coordination of vision and touch can thus count on the important advantage of operating at a distance, of “directly” manipulating an object that is only digitally present in its own space.

Certainly, we do not owe the importance of gesture in our evolutionary path to these devices. With the advent of digital technology, however, the cognitive bearing of gestures has acquired a further nuance of meaning: we think with our hands also because, over time, touching has become the operative gesture par excellence, holding together the material quality of direct manipulation and the abstract quality of reflection that does not imply to immediate practical purposes (Flusser 1985, 28-29). It is no coincidence that Apple began to speak of «spatial computing», rather than augmented reality: the aim of this type of tool is to innervate the subject’s body (Benjamin 2008) in order to transform the surrounding

environment into a space for thinking, in which one can experiment with objects that offer the possibility of producing a large number of the aforementioned epistemic actions.

As we have seen, everyday experience already activates a “virtual sensibility”. Contemporary cognitive science has very effectively proposed summarising the sense of interpretive and agentic potential that responds to environmental stimuli in the expression «I-can» (Di Paolo, Buhrmann & Barandiaran 2017, 230), reminiscent of the famous Husserlian formulation. Even in terms of the anatomy of the brain, it has been pointed out that, in addition to the more widely discussed “mirror” neurons, there are neurons, known as “canonical”, that are specifically designed to gauge the extent to which it is possible to take hold of an inanimate object without the latter being involved in an action that we ourselves perform or that we see someone else performing (Rizzolatti, Fogassi & Gallese 2002, 151). In this respect, interactivity is not limited to digital material. For example, when I see a cup on the table, I am immediately led to feel the range of virtual actions that my body could perform in relation to the object, and only thanks to it (e.g., gripping, moving, bringing my face closer to drink).

What is specific to AR is that it works to make visible the “I-can” of the user’s space, highlighting as much of the potential for modification and intervention available to the user as possible, and thus arguably expanding the range of information and connections that can be perceived without it. In this way, the augmented digital entities with which we interact are designed to increase the informational and operational scope of a context, particularly in specialised fields such as medicine, warfare, industry and advertising: it can instruct workers on the steps needed to build a particular model of an aircraft or a car; it can support the strategic operations of an army; it can show us how we would look with a new pair of glasses that we have not yet bought. And it asks us to physically interact with its additions, potentially incorporating every movement we make into a way of thinking.

5. What do we mean when we say “augmented imagination”

In order for AR tools to work when we put into focus a section of space with our mobile phone or smart glasses, and to respond exactly as we want, the software we employ requires an extenuating training process. This training is not only for the machine that learns from our movements, but also for the consumers who have to learn how to use it. There is a reciprocal power play between the two poles, in which it is by no means obvious that the user is in control: as Don Ihde and Lambros Malafouris would say, «we make things which in turn make us» (Ihde & Malafouris 2019, 196). On the one hand, AR technologies bring about the fusion of the individual with the other in a broad sense, namely environments, objects, other beings, implementing the layers of reality, in space and time, on the basis of which the mind is constituted and nourished, and thanks to which it transforms itself; on the other hand, they read reality through algorithmic systems, thus conveying a fragmented and regimented understanding of it in a limited set of instructions.

If it is true that, in order to provide assistance, AR technologies use their privileged position as portable and/or wearable to innervate the complex system of human gestures, it is also true that they require us to repeat certain specific gestures, effectively teaching us how to behave in a given setting involving their use. In other words, to imagine following their code.

One might then be tempted to view this as a discontinuity, arguing that the imposition of an “augmented” imagination, with its now fully post-human characteristics, has brought about a radical break with the all-too-human imagination of the past. In the transition to the 21st century, through the proliferation of a range of technologies capable of juxtaposing new parts of the world in the environment, it might be said, we have learned to imagine by

adding layers of digital information between which to juggle and make previously unknown connections (Wellner 2018, 47). In the age of wearable and algorithmic computing, imagination would thus be claimed to have become a purely mechanical and digital operation, this time truly externalized as being increasingly entrusted and even delegated to the smart devices we use (Liberati 2022, 407-408).

But what level of performance can imagination truly ensure if it is not fundamentally an operation of assemblage, through the fruitful connection of elements near and far, present and past, and so on? The result of an interactive collaboration that links different constituents, imagination is always *between* the human being and the other realities that make up an environment.

On the contrary, given its constant innervation in a space and a body, its interactive and operational dimension, AR presents itself today as the technology of (human) imagination *par excellence*. While the advent of the digital has certainly opened up areas of activity that were literally unimaginable before, this has been possible because the imagination, always active in the construction and use of tools, reconfigures itself from time to time according to its interplay with our material culture. An element added to the fabric of the world cannot but change its entire texture. Augmented objects have become part of the environment alongside physical objects, but they offer us different possibilities that redirect operability in space, starting with how they elicit reactions in the body (Pirandello 2023). Moreover, the use of AR still needs to be anchored in a physical environment: in this sense, the imagination that emerges from the interaction of different materials cannot be considered as being purely digital, but rather as being of a mixed nature.

AR is a technology that is deliberately designed to re-educate imagination, whose characteristic is precisely that of being shaped by the human relationship with technology. Using headsets and goggles, as well as screen-based AR, we are asked, as bodies in motion, to collaborate with objects in space and with other users, even at a distance (Lukosch et al. 2015). Indeed, augmented imagination extends its reach to include algorithmic systems that connect us to other individuals in distant places and times (Finn 2017, 193). Imagining has always meant thinking together; in this case, we are increasingly imagining together with objects that relate us to other objects and other people. Hyper-linking is the specific enhancement of augmented imagining, an increasingly common mode of thinking, creating and remembering. Indeed, AR has a strongly relational vocation, to the point of mobilizing collective proprioception (Fedorova 2020, 236-239). Greater connection, even fusion with the other, is one of the main promises of augmentation that computer networks have been pushing towards for years. Thus, by wearing devices such as HoloLens 2, one can make others see what one sees, even in real time, to create a shared perception derived from a single collective body, which could lead to the hypothesis of the emergence in the future of collective individuals (Liberati 2020, 43).

So, why, if we have always used technologies, should AR be considered a tool specifically concerned with imagination? Because it was designed for the very purpose of being implanted in the body, mobilizing it in as many activities as possible. Much like the case of Tetris, cited above, the expectation is that it will speed up our cognitive processes, reveal more possibilities, and eventually reduce errors in every task it is applied to. Regardless of the more or less creative results achieved, the use of AR necessarily affects the performance of the imagination, as it changes the way we bodily interact with objects in space.

The term “augmented reality” tends to emphasize a quantitative aspect. It is certainly true that, on the one hand, AR implies the addition of things and information in a space. But over time, “more” also means “different”: images and artefacts of the world are not the seat of human creative thought projected outwards. This is especially true in the case of responsive digital objects, which engage all of our cognitive resources, inside and outside

us, and demand constant physical exploration and experimentation, even for activities that do not normally require them, in order to transform as many actions as possible into hyperlinked epistemic actions.

6. What is inside is outside and vice-versa

This exploration of the constitutive entanglement of human capabilities and sensible and virtual matter, allows us to call into question the theoretical model of extension, to complexify it through the action of imagination. We now need to consider: if we can apply the paradigm of extension to the imagination, must we conclude that, as imagination is indeed augmented by technology, then our imaginative capacities might risk being atrophied or de-sensitized, just as human beings risk being de-skilled in their interaction with technologies? In his account of technicity in human evolution, Leroi-Gourhan expressed a similar concern with regards to the possible effects of further technologization of the body and its functions. On the one hand, he wondered whether in the future, with ever increasing technological exteriorization, the human being will end up feeling «encumbered by the archaic osteomuscular apparatus inherited from the Palaeolithic» (Leroi-Gourhan 1993, 249). But, more importantly for our present discussion about the powers of imagination, he also pointed out that our familiarity with audio-visual communication, media, and devices would eventually lead to a loss of the exercise of the imagination, with decisive consequences for human agency, considering that «a society with a weakened property of symbol-making would suffer a concomitant loss of the property of action» (Leroi-Gourhan 1993, 214).

In fact, underlying this legitimate concern is a somewhat fallacious argument. This would entail thinking of imagination as a stable transcendental faculty, whereas, as we suggested in the perspective of material culture, it is rather informed and constantly reshaped in the contact between human beings and the environment. In other words, while we still tend to conceive of imagination as an internal faculty, we need to acknowledge that imagination has always been primarily *outside of us*. We should think of it as a by-product of technologies as much as their source, in a relationship of reciprocal feedback or feed-forward. To put it in a nutshell, there exists no imagination separated from its extensions, from its technological prostheses: it is the technology that makes the faculty, as much as it results from the faculty (Koukouti & Malafouris 2020).

A trace of this inseparable co-implication can be found in the way we describe cognitive processes through figurative language that draws on our technical exchange with the world (and the way these metaphors change throughout history and the modifications of the coupling between humans and technologies): as we say that we try to “replay our memories” in our head, that we need to “put something into focus” to understand it better, and that we “are on the same wavelength” if we share attitudes and opinions or are capable of “tuning in” to others’ perspective, and so on. Technologies and media contribute to designing and informing our reality; they «classify the world for us, sequence it, frame it, enlarge it, or reduce it, argue a case for what it is like» (Postman 1993, 39). As much as they entail a reconfiguration and a structural transformation of our experience of the world (Ihde 1979, 66), technologies act like «metaphors through which we conceptualize reality in one way or another» (Postman 1993, 39). It is in this sense that we can affirm, without any hint of determinism, that technologies and media «determine our situation», as Friedrich Kittler asserted in the opening of his *Gramophone, Film, Typewriter* (Kittler 1999), insofar as they shape the *forma mentis* of a certain epoch, its perceptive, cognitive and imaginative possibilities. Technological *a priori* are the very form of our relationship with the world, they constitute the very dimension of experience.

Thus, imagination is a structural form of augmentation of the real. In the wake of recent studies in material culture and the extended mind, we have learnt that we should not conceive of it as a cognitive faculty in its own right, but as a capacity that is modelled and constantly informed in bodily and material contact with the environment and in particular with technologies and media. Augmented reality technologies make it more evident that the technical object, once it is invented, then comes to modify imaginative operability with a reciprocal feedback effect: there is a feed-forward of the extensions on the faculty, so that, if imagination is what allows an extension of human capacities and therefore technicity itself, it is in turn augmented and constantly reshaped by it.

The relationship between technology and imagination thus needs not only to be reframed as a two-way movement – of externalization and incorporation – but also more radically historicized. Then not only is imagination not amputated by its technological extensions, but it must be thought of as constitutively augmented by technology, i.e., it is fundamentally historical and situated, inseparable from the technoculture of a certain epoch. Imagination does not go through a process of externalization; it has been *outside of us all along*. If we do not take into account this reciprocal feedback, we fail to think through the paradigm of “extension”, always at the risk of reducing it to a one-way, merely unidirectional trajectory, going from inside to outside (in the movement of externalization) or from outside to inside (in the movement of incorporation). Whereas, to quote Goethe, we still need to consider that «nothing is inside, nothing is outside; For what is inside is outside» (Goethe 1957, 97).

Bibliography

- Barbera, D. (2024). Vision Pro, Apple chiude la produzione. *Wired*: <https://www.wired.it/article/apple-vision-pro-fine-produzione/>.
- Benjamin, W. (2008). *The Work of Art in the Age of Mechanical Reproduction*. Engl. Trans. J. A. Underwood. London: Penguin Books.
- Brey, P. (2000). Theories of Technology as Extension of Human Faculties. In C. Mitcham (ed.), *Metaphysics, Epistemology, and Technology* (Research in Philosophy and Technology, Vol. 19) (59-78). Amsterdam: JAI.
- Carbone, M. & Lingua, G. (2023). Screens' r'us: From Bodies with Prostheses to Bodies as “Quasi-Prostheses”? In M. Carbone & G. Lingua (eds), *Toward an Anthropology of Screens* (135-160). Cham: Palgrave Macmillan (https://doi.org/10.1007/978-3-031-30816-1_6).
- Caudell, T.P., Mizell, D.W. (1992). Augmented Reality: An Application of Heads-Up Display Technology to Manual Manufacturing Processes. *Proceedings of the Twenty-Fifth Hawaii International Conference on System Sciences*, 2, 659-669 (<https://doi.org/10.1109/HICSS.1992.183317>).
- de Kerckhove, D. (2014). *Psicotechnologie collettive*. Trad. it. di M. Vegetti. Milano: Egea.
- Di Paolo, E. et al. (2017). *Sensorimotor Life: An Enactive Proposal*. Oxford, UK: Oxford University Press.
- Dissanayake, E. (2001). *Homo Aestheticus: Where Art Comes from and Why*. Seattle: University of Washington Press.
- Dong, Z. (2020). A Comparison of Surface and Motion User-Defined Gestures for Mobile Augmented Reality. *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems*, 1-8 (<https://doi.org/10.1145/3334480.3382883>).
- Eugenì, R. (2021). *Capitale algoritmico. Cinque dispositivi post-mediali più uno*. Brescia: Morcelliana.
- Fedorova, K. (2020). *Tactics of Interfacing: Encoding Affect in Art and Technology*. Cambridge-London: The MIT Press.

- Finn, E. (2017). *What Algorithms Want: Imagination in the Age of Computing*. Cambridge-London: The MIT Press.
- Flusser, V. (2011). *Into the Universe of Technical Images*. Engl. Trans. N.A. Roth. Minneapolis: University of Minnesota Press.
- Flusser, V. (2014) *Gestures*. Engl. Trans. N. A. Roth. Minneapolis: University of Minnesota Press.
- Goethe, J. W. von (1957). *Poems of Goethe: A Sequel to "Goethe, the Lyrist."* Engl. Trans. E. H. Zeydel. Chapel Hill: University of North Carolina Press.
- Grespi, B. (2019). The Technical Object and Somatic Thought. Theories of Gesture between Anthropology, Aesthetics and Cinema. *Aisthesis. Pratiche, linguaggi e saperi dell'estetico*, 12 (2), 63-75.
- Hall, E. T. (1976). *Beyond Culture*. New York: Anchor Books-Doubleday.
- Ihde, D. (1979). *Technics and Praxis: A Philosophy of Technology*. Boston: D. Reidel Publishing Co.
- Ihde, D. (1990). *Technology and the Lifeworld: From Garden to Earth*. Bloomington: Indiana University Press.
- Ihde, D. & Malafouris, L. (2019). Homo faber Revisited: Postphenomenology and Material Engagement Theory. *Philosophy & Technology*, 32, 195-214 (<https://doi.org/10.1007/s13347-018-0321-7>).
- Kapp, E. (2018). *Elements of a Philosophy of Technology: On the Evolutionary History of Culture*. Engl. Trans. L. K. Wolfe. Minneapolis: University of Minnesota Press.
- Kirsh, D. & Maglio P. (1994). On Distinguishing Epistemic from Pragmatic Action. *Cognitive Science*, 18 (4), 513-549 ([https://doi.org/10.1016/0364-0213\(94\)90007-8](https://doi.org/10.1016/0364-0213(94)90007-8)).
- Koukouti, M.D. & Malafouris, L. (2020). Material Imagination: An Anthropological Perspective. In A. Abraham (ed.), *The Cambridge Handbook of the Imagination* (30-46). Cambridge: Cambridge University Press (<https://doi.org/10.1017/9781108580298.003>).
- Leroi-Gourhan, A. (1993). *Gesture and Speech*. Engl. Trans. A. Bostock Berger. Cambridge, MA: The MIT Press.
- Liberati, N. (2020). The Borg-Eye and the We-I: The Production of a Collective Living Body through Wearable Computers. *AI & society*, 35 (1), 39-49 (<https://doi.org/10.1007/s00146-018-0840-x>).
- Liberati, N. (2022). Reflections on an Externalized Digital Imagination. *Foundations of Science*, 27, 407-410 (<https://doi.org/10.1007/s10699-020-09768-9>).
- Lukosch, S. et al. (2015). Collaboration in Augmented Reality. *Computer Supported Cooperative Work*, 24, 515-525 (<https://doi.org/10.1007/s10606-015-9239-0>).
- Mauss, M. (2006). Techniques of the Body. In *Techniques, Technology and Civilization*. Engl. Trans. N. Schlanger (77-96). New York-Oxford: Durkheim Press-Berghahn Books.
- McLuhan, M. (1964). *Understanding Media: The Extensions of Man*. Cambridge, MA: The MIT Press.
- Merleau-Ponty, M. (1963). *The Structure of Behavior*. Eng. Trans. A. L. Fisher. Boston: Beason Press.
- Merleau-Ponty, M. (2005). *Phenomenology of Perception*. Engl. Trans. D. A. Landes. London and New York: Routledge.
- Merleau-Ponty, M. (1968). *The Visible and the Invisible*. Engl. Trans. A. Lingis. Evanston, IL: Northwestern University Press.
- Meta (2024). *Introducing Orion, Our First True Augmented Reality Glasses*. September 25, 2024 (<https://about.fb.com/news/2024/09/introducing-orion-our-first-true-augmented-reality-glasses/>).
- Montani, P. (2014). *Tecnologie della sensibilità. Estetica e immaginazione interattiva*. Milano: Raffaello Cortina.

- Münsterberg, H. (2013). The Photoplay. In A. Langdale (ed.), *Hugo Munsterberg on Film: The Photoplay: A Psychological Study and Other Writings*. London and New York: Routledge.
- Pirandello, S. (2023). *Fantastiche presenze. Note su estetica, arte contemporanea e realtà aumentata*. Milano: Johan & Levi.
- Postman, N. (1993). *Technopoly: The Surrender of Culture to Technology*. New York: Vintage.
- Rizzolatti, G. et al. (2002). Motor and Cognitive Functions of the Ventral Premotor Cortex. *Current Opinion in Neurobiology*, 12 (2), 149-154 ([https://doi.org/10.1016/s0959-4388\(02\)00308-2](https://doi.org/10.1016/s0959-4388(02)00308-2)).
- Steinert, S. (2016). Taking Stock of Extension Theory of Technology. *Philosophy & Technology*, 29, 61-78 (<https://doi.org/10.1007/s13347-014-0186-3>).
- Stiegler, B. (1998). *Technics and Time, 1: The Fault of Epimetheus*. Engl. Trans. R. Beardsworth & G. Collins Stanford: Stanford University Press.
- Verplaetse, C.J. & Della Silva, C.D. (2023). Electronic Devices with Projector. *United States Patent* (<https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/11740689>).
- Walton, K. L. (1990). *Mimesis as Make-Believe: On the Foundations of the Representational Arts*. Cambridge, MA: Harvard University Press.
- Warren, T. (2024), Microsoft is Discontinuing its HoloLens Headsets. *The Verge*, October 1, 2024 (<https://www.theverge.com/2024/10/1/24259369/microsoft-hololens-2-discontinuation-support>).
- Wellner, G. (2018). Posthuman Imagination: From Modernity to Augmented Reality. *Journal of Posthuman Studies*, 2 (1), 45-66 (<https://doi.org/10.5325/jpoststud.2.1.0045>).
- Wellner, P. et al. (1993). Computer Augmented Environments: Back to the Real World. *Communications of the ACM*, 36 (7), 24-26 (<https://doi.org/10.1145/159544.159555>).
- Williams, A. S. et al. (2020). Understanding Multimodal User Gesture and Speech Behavior for Object Manipulation in Augmented Reality Using Elicitation. *IEEE Transactions on Visualization and Computer Graphics*, 26 (12), 3479-3489 (<https://doi.org/10.1109/TVCG.2020.3023566>).

What to Do with AI Images? Towards an Epistemology of Trust¹

Alessandra Scotti

Abstract. *The aim of this article is to explore, within the field of visual culture, the ethical and social challenges raised by AI images, the reference imaginaries involved, and the expectations of meaning that arise. The paper will pursue the following line of argument: first, it will examine images that reflect forms of artificial intelligence according to the categories of operative image (i) and invisible image (ii), to investigate the agentic nature of AI images by asking “what do they want from us?” (Romele & Severo 2023) and relate these images to the critical literature that reflects on the concept of “image opératoire”. To elucidate the ways in which technology and the imaginary mutually nourish each other, I will draw on Castoriadis and conceive AI imaginary as both instituted and instituting (Castoriadis 1975), so as to claim a “thoughtful” nature to AI images. This removes them from the stereotypical and numbing forms in which they are usually presented and allows their instituting as well as instituted nature to be imagined in a way that can enable trust in them. This process opens the door to an ethics of the visible that is deeply rooted in the aesthetic regime and situated on an affective level, so to speak.*

Keywords. AI, Images, Visual studies, Imaginary, Castoriadis.

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1. Introduction

The purpose of this article is to investigate, within the framework of visual studies, the ethical and social challenges posed by AI-generated images,² the imaginaries they conjure, and the expectations they fulfill. As Hal Foster (1988) has already noted, the visual does not only concern visual data, but also its *discursive nature*. In other words, what we see,

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² In this article, I will only deal with static images, as I have considered databases such as GettyImages and Shutterstock. I plan to analyse platforms such as HeyGen, Synthesia, and DeepBrain AI – which allow individuals without video editing skills to effortlessly create generative AI videos based solely on a script – in a future, as I believe that the inclusion of dynamic visual media could enrich the analysis and reflect the diversity of AI’s visual output.

what we are able to see or what we are permitted to see each time requires a redefinition of the dialectic between the visible and the invisible inherent in every scopic regime and relates to both the politics of the image and the imaginary of a given society. This rooting of an image in gaze, and in the media that define vision, calls upon a historical dimension of the image: each era does not only have different styles, arts, and images, but also perceives them differently, which, in turn, feeds and constructs new imaginaries. So, the question is: how should we represent artificial intelligence, and what philosophical categories should we use to outline the technological imaginary associated with it?

Although the ethical debate on AI is vast and inherently interdisciplinary – involving philosophers of law, bioethicists, neuroscientists, educators, and “pure” philosophers – and although the tasks required of an AI ethicist are often numerous and unrealistic (Cocchiari et al. 2024), the scholarly debate on AI images is virtually nonexistent. There is a significant gap in AI literacy regarding the issue of AI images; Romele (2022) rightly speaks of a blind spot.

One might ask why the image itself poses a problem. But this question naturally evolves into how to build public trust in AI and how to construct an epistemology of trust and belief through its visual representation, especially when an image, as the saying goes, is worth a thousand words. In this article, I will explore why the issue of what images we use to represent AI raises numerous philosophical questions, ranging from aesthetics to ethics, from philosophy of technology to politics. The structure of this paper is as follows: after a brief examination of the common features of the images we use to represent AI, the section following this introduction will attempt to decode the current socio-technological imaginary – particularly its homogenized and stereotypical features – by reflecting on the concept of the image itself, highlighting its agentic function on the one hand and its invisible nature on the other. In the second section, the agentic nature of images will be emphasized and a tradition that refers in particular to anthropology and art history will be referenced, so as to highlight the typical function of the image to «distribute the sensible» (Rancière 2013). This function will prove not to be limited to the vector of representation. Ultimately, this will also allow us to emphasize that images are never “aseptic” in their relationship to us, but always the historical product of underlying power relations. In the subsequent section, in view of their invisible nature, AI images will be considered in the context of an eye-to-machine process, in which the image becomes increasingly detached from its sensory nature. As a result, the reference imaginaries become self-reinforcing, triggering a process of progressive exclusion of the human gaze.

AI images’ invisibility allows the discourse to move from a purely reductionist level – where the image is supposed to represent the thing – to a much more complex one, anchored in the affective sphere and related to beliefs and expectations of meaning, as well as to a trust-building effort, which attempts to go beyond a simple and sterile appeal to transparency. In other words, we do not trust a technology simply because it is presented to us transparently; rather, this trust emerges from an epistemological process of “public construction of trust”, which also involves visual education. In this context, the theoretical reference to Castoriadis and his theory on the instituent as well instituted character of imaginaries in the last part of the paper is instrumental in highlighting their ability to identify something in the reference imaginary that unifies and sustains society, while acknowledging that this imaginary must remain dynamic to retain its meaning and avoid becoming sclerotized.

A very brief overview of images of AI – for instance, through a simple Google image search – reveals their markedly stereotypical nature, raising several theoretical questions:

1. What common characteristics define the images typically used to represent AI?

2. To what extent do these images distance us from AI, or even hinder our understanding of it? Consequently, how can we develop a visual education that fosters understanding rather than reinforcing this distance?

First of all, we can see that the majority of these images is anthropomorphic. This should not come as a surprise. As with non-human animals – anthropology teaches us that the earliest images depicted animals – they represent the other, the removed, the unsettling, and serve a specific function in the structuring of a society. For this reason, if every social, religious, political, and cultural identity in the act of its foundation provides for the exclusion of an otherness, then the establishment of human primacy corresponds to the disparagement of animals. This forgetting of the beastly goes hand in hand with the primal fear of animal vengeance, a recurring leitmotif that resonates throughout the obscure social and cultural rules encapsulated by the terms totem and taboo. This theme extends beyond primitive forms of society and even reaches the contemporary era, in certain forms.

The highly anthropomorphized images of AI are probably a somewhat clumsy attempt to make sense of them by attributing human traits to them. After all, we anthropomorphize anything to which we ascribe intelligence (machines, gods, aliens, etc.).

Let us consider a concrete example to substantiate this claim. The news section of the European Parliament's website features an entire article discussing the EU's AI Act as the first significant piece of legislation on artificial intelligence. The [AI-generated image](#) accompanying the article is entitled *Limitless Visions* and comes from Adobe Stock. It is a profile shot of two men facing each other against a blue background onto which blurred lines of source code are projected. The man on the left – who should represent AI – resembles the man on the right in every way. He is wearing a shirt, just like his human counterpart, and is depicted with an open hand, which in gestural language signifies helpfulness, loyalty, and authenticity. The AI is completely analogous to its human counterpart, except for the face, which is transparent, drawn by the contours of bright neural networks.

One consequence of the process highlighted in this example is that images which resemble humans reflect the distortions, prejudices, and cultural habits embedded in our society. Several studies (Cave et al. 2020; Aiello 2022) highlight how the more humanized images used to represent AI are, the more they carry gender stereotypes. For example, AI is often depicted as a female when portrayed as a nurse. Consider [Image 1](#), which comes from one of the large image databases. Enter "nurse" as the search term and "AI-generated content" as the filter. The description of the image is particularly interesting: «A modern, AI-powered nurse robot is wearing a *white* lab coat and headset. She is sitting at a desk, looking at a computer screen with a patient's medical records. Her face is *calm* and *reassuring* as she listens intently to the patient's concerns» (italics mine). When we look at this picture, we immediately notice a few things: the nurse has a clear gender connotation – she is depicted with clearly visible breasts – she is highly anthropomorphized (as we saw earlier) and her human appearance is only given away by a machine-like neck, a dense tangle of dark-coloured wires, which contrast with the whiteness³ of her uniform. This whiteness is also associated with the supposed calm and reassurance she is meant to instill in the viewer (or the hypothetical patient in front of her). Shutterstock's AI, which is created based on the images it has access to, acts as a kind of algorithmic food. If a culture has a long history of relegating women to subordinate roles, the developers of AI systems will likely ascribe a female gender to those roles.

³ About the whiteness of AI see Cave & Dihal (2020).

Professional artists and communicators are well aware of the power of images (Freedberg 1989). Images can inform, inspire, attract attention, or simply entertain. Inaccurate or misleading images wield the same power, but their effects can potentially be harmful: they can misinform, limit imagination, or divert attention from divisive issues. In other words, images are never neutral, and the aesthetics they delineate are equally consistent with an ethics rooted in the regime of the senses.

One of the most controversial outcomes of using “bad” images of AI (where “bad” means stereotypical, numbing, replicating the same graphic patterns) is that they flatten the imaginary (if we can put it that way) by reducing it to existing imagery. Consider the history of advertising: when we look at an advertising campaign from many decades ago, we immediately feel a sense of detachment and incredulity because the image no longer translates an imaginary coherent with the current social reality. How can we imagine better images of AI⁴ in this sense? Which philosophical categories can we use to deconstruct the reference imaginary of AI, while utilizing the imaginative, subversive, instituent, and non-instituted potential of images of AI?

2. What kind of image? Two useful categories of images of AI

In my opinion, it may be useful to categorize images representing artificial intelligence into two types:

1. Operational Image (i)
2. Invisible Image (ii)

First, it is essential to investigate the agentive nature of AI images – images as something that *does something* to us – and to relate these images to critical literature, particularly in the field of art history, which reflects on the concept of «operational image» (Freedberg 1989; Gell 1998; Mitchell 2005; Bredekamp 2010). It is then necessary to highlight the complex and, in some ways, unrepresentable or invisible nature of images of AI. They involve a series of operations that are not necessarily visible to the human eye, creating a machine-to-machine visual culture (Paglen 2016) and triggering a semantic shift whereby images are no longer sensory entities, but increasingly produced by machines for other machines. This fuels the process of machine learning training, which that should be analyzed from the perspective of dataset archaeology, given that no image is ever politically neutral and that images generated by GANs are not free of bias.

To begin with, I would argue that the question “What is an image?” requires an anthropological approach, since, as we shall see, the answer is primarily determined at the cultural level (Belting 2011). Secondly, I would like to recall Stiegler’s words: «[t]here have never existed physical images (images-object) without the participation of mental images, since an image by definition is one that is seen (is in fact one when it is seen)» (Derrida & Stiegler 2002, 145) – by someone or something.

In the opening of *The Power of Images*, Freedberg writes:

⁴ *Better Images of AI* is also a non-profit organization dedicated to researching, creating, curating, and providing better images of artificial intelligence. It commissions artists to produce free stock images that avoid perpetuating harmful myths about AI. Learn more at <<https://betterimagesofai.org/about>>.

People are sexually aroused by pictures and sculptures; they break pictures and sculptures; they mutilate them, kiss them, cry before them, and go on journeys to them; they are calmed by them, stirred by them, and incited to revolt. They give thanks by means of them, expect to be elevated by them, and are moved to the highest levels of empathy and fear. They have always responded in these ways; they still do. They do so in societies we call primitive and in modern societies; in East and West, in Africa, America, Asia and Europe. (Freedberg 1989, 1).

This power that Freedberg ascribes to works of art should be extended to all images: the ability to generate emotions (repulsion or admiration, nostalgia, or even empathy) does not depend, we might say, on the medium by which it is embodied. It does not exclusively belong to painting or sculpture, but can also arise when looking at a photo in our iPhone album. In this sense, we can affirm that the image has its own agency, but image theory today actually engages with at least two significantly different interpretations of the concept of agency.

2.1 A double concept of agency

When we talk about image agency, I think we need to distinguish between at least two types. The first interpretation is primarily based on the theory of art formulated by British anthropologist Alfred Gell in his work *Art and Agency*. Broadly speaking, it falls within a theory of agency that emphasizes the attribution of subjective intentionality to images and objects, «which are seen as initiating causal sequences of a particular type» – which is actually Kant's definition of freedom: to initiate a new causal series – «that is, events caused by acts of mind or will or intention, rather than the mere concatenation of physical events. An agent is one who “causes events to happen” in their vicinity» (Gell 1998, 16).

This first interpretation of agency is complemented by another – which we can call Agency 2 – that does not require the postulation of subjectivity. Instead, it is transindividual and more concerned with the norms and social structures that Agency 1 overlooks – norms that it endures, shifts, or negotiates. The Agency 2 perspective reminds us that images and the ordinary relationships we have with them are the product of historical power relations that remain operative. We will try to navigate between these two interpretations of agency, while exploring the intermediate positions that lay the foundation to potentially articulate.

For example, the “racial” construction of our visual field required the creation and implementation of the visual norms and categories that underpinned the ideology of colonialism. Another good example of AI images' operational dimension is their use in medical imaging: AI offers the crucial ability to analyze vast volumes of medical images, enabling the identification of disease features that are unrecognizable to the human eye. In this sense, it holds the same epistemic value as the great optical technologies – from telescopes to microscopes – that made it possible to improve and expand the spectrum of vision. The same could be said of aerial surveillance imagery (see Dorian & Pousin 2023), which has always been linked to the development of military technologies and the new kind of surveillance gaze that drones deploy. In recent years, the application of these technologies for civilian use – such as satellite imagery – has redrawn the boundaries between private and public, personal and collective space. The widespread use of surveillance cameras that monitor and record ever-larger areas of public and private space, along with land mapping systems such as Google Street View, produces an immeasurable mass of images that no viewer will most likely ever see. This also leads to the colonization of previously invisible visual territories and gives rise to a huge field of research called surveillance studies (see Lyon 2007).

In Gell's view, art objects' importance lies not in beauty, but rather in fascination: he argues that what we call art objects, as well as many other things that we would not nec-

essarily think of classifying under this term, possess a force of fascination. In other words, art should be anchored in a theory of knowledge or, better yet, the aim should be a philosophy of the image – or even an assimilation of aesthetics and ontology, a sensory ontology, so to speak. Gell states: «I place all the emphasis on agency, intention, causation, result, and transformation. I view art as a system of action, intended to change the world rather than encode symbolic propositions about it. The “action”-centred approach to art is inherently more anthropological than the alternative semiotic approach because it is preoccupied with the practical mediatory role of art objects in the social process, rather than with the interpretation of objects “as if” they were texts» (Gell 1998, 6).

Speaking of an *image opératoire* also means recognizing that the question of the image is far from limited to representation. According to the seminal studies by Jean-Pierre Vernant (Vernant 1991), the reduction of the image to the semantic field of representation only took place in Greece in the 4th century BCE: Plato placed every image under the lens of *mimesis* and defined mimetic activity as *eidolon demiourgia*, or the «making of simulacra». However, *eidolon* was not always synonymous with mimetic artifice. Indeed, in the archaic period – between the 8th and 5th centuries BCE – an idol was not understood as an image confined to a relationship of resemblance to a model. Rather, it was associated with a certain ability to make visible, to portray, and to bring forth a supernatural power, even to realize it in concrete form. The image was hidden and governed by a specific dialectic of concealment and revelation.

It is no coincidence that when Vernant thought of the *eidolon*, he had in mind the ghostly images that populate Hades in Homer’s masterpieces: the specter of Patroclus in Achilles’ dream is not a copy of the flesh-and-blood man, nor is it a mere semblance, but an apparition, a double in the sense of a substitute, a marker, one who stands in for someone else – and in this sense it functions as an *evocative device*. The idol makes present and at the same time measures the abyss that separates the world of humans from that of the gods, the realm of the dead from that of the living: the archaic *eidolon*, characterized by this dialectic of presence and absence marked by magical element, manages to manifest something that is, at the same time, stamped with the seal of absence. The image gives us something to see, and at the same time it affects us.

So far, I have argued that images do not only have a purely cosmetic value but also an ethical-political dimension, albeit implicit: they convey expectations, prejudices, and desires of a particular society. Recognizing the agentic character of images is the first step toward broadening the discourse on images and giving it an ethical dimension. In doing so, I have identified two nuances of the meaning of agency: the first attributes a form of subjective intentionality to images, while the second does not concern images alone, but more broadly the imaginaries associated with the narratives that a given society makes of itself. The latter are never neutral, but mediate power relations that remain at least latent, if not explicit. Finally, recognizing the acting character of AI imaginaries means that the value of images is not limited to the representation vector.

Having clarified this theoretical framework, I would like to move on to the other category at play in AI images, which is that of the *invisible image* (which, in a certain sense, also allows us to pass from Agency 1 to Agency 2) and to consider the more ethical and ethico-political implications of the unrepresentability of AI images.

3. Invisibility in AI images

At the end of the previous section, we established the importance of looking at AI images through the interpretative lens of the operative image, and not taking for granted the neutrality of the images that flood contemporary visual communication, both scien-

tific and popular. It is now a matter of turning to the other philosophical category at play: that of invisibility.

Even the most commonplace myths suggest that the idea of invisibility remains provocative and fascinating across centuries and cultures (the cloak of invisibility, the magic ring, etc.), fueling fairy tales and popular legends. We can say that each iteration of the relationship between the visible and the invisible raises questions not only of aesthetics calibre, but also ethical and political: how is it that some things remain invisible while others manifest themselves? What does the fundamental relationship between the visible and the invisible mean, especially – yet not exclusively – for visual culture? Our way of seeing and our acts of vision are necessarily indicative of our ethics, of how we envisage human relationships. Consider, for example, the complexity of the dynamics of being seen and not being seen – the so-called «invisibles», *those that have no part*, as Rancière (2004) described them – and how this dialectic continues to animate the discourse on political identities.

Moreover, the advent of mechanical vision introduces not only new visual regimes, but also new paradigms of visibility, in which – to use Paglen's words – «images are overwhelmingly invisible, even as they're ubiquitous and sculpting physical reality in ever more dramatic ways» (Paglen 2014, 3). Consider the images contained in databases such as ImageNet or Laion-5B, which currently hold almost 6 billion images and captions. These databases are used (among other things) to train Imagen or Stable Diffusion, which function similarly to the perhaps better-known Dall-E 2. They provide the staple diet for the production of novel AI-generated images. And yet, as Melanie Mitchell notes, «seeing – both seeing and looking – turns out to be one of the hardest of the “easy” things» (Mitchell 2019, 59). Unless they are blind from birth, humans have the ability to observe – that is, to look at and recognize an image in a fraction of a second. This is a process of which we are barely aware, almost an automatism. But that is not all: in visual processing, we are also able to link an image to a reference context by following a kind of visual pragmatics. We immediately know what to keep in an image and what to leave out. So, we could ask: What is the semio-pragmatic dimension of an image database? Who decides what to keep and what to leave out and how? The basic idea is that every «field of images is organized» (Rose 2010, 61), embedded in complex, specific and diverse «social relations, practices and institutions» (Rose 2010, 62).

Authors Kate Crawford and Trevor Paglen aim precisely to uncover «the construction of these training sets and the “underlying structures” that often betray “unquestioned assumptions”» (Crawford & Paglen 2021, 1006). The result is that «every layer of the architecture of a given training set is infused with politics» (Crawford & Paglen 2021, 1007). Data sets are never a collection of raw material to feed algorithms, instead they underlie policy operations. Consequently, to argue for the plausibility and necessity of an ethics of images, and AI images in particular, means to unravel, at least partially, these supposedly neutral political mechanisms: to unlearn how humans see, to learn to see the invisible. These invisible images invite us to rethink our concepts of visibility and invisibility. The latter is, from the outset, a matter of relationality: the invisible «is the secret counterpart of the visible», to use Merleau-Ponty's words (Merleau-Ponty 1969, 215).

As Øyvind Vågnes notes, «the subject of invisibility might be approached through the prisms of aesthetics, representation, technology and politics» (Vågnes 2019, 3). How should we invoke the concept of the invisible when referring to images of AI, though? First of all, these are images that struggle to activate the vector of representation. In a sense, they are empty containers of meaning. We might say that they owe their banality to the fact that meaning transcends the iconic signifier. We struggle to process, circulate, and consume good AI images because perhaps it does not make much sense to talk about AI in general terms. As a result, AI seems like an object that is too fragmented, hidden,

and invisible to come up with an adequate image of it. There was a moment in the history of philosophy when a similar difficulty arose: when the new fields of psychology and phrenology tried, then too by resorting to iconic representations, to make sense of that obscure thing called the brain. Just as a photograph of a brain or a measurement of a skull does not do justice to the complexity of the human mind. Similarly, using the image of an algorithm to represent AI is equally reductive. Furthermore, the issue of invisibility leads us to think about transparency, a topic of great interest in the branch of philosophy of technology that reflects on intelligent machines.

Technology is the (invisible) condition of visibility.⁵ «Phenomenological transparency», as Michael Wheeler has called it (Wheeler 2022, 16), is the impossibility to focus one's attention on both the action and its (technological) means, and, for systems, to simultaneously see and be seen. Yet, this is not the first time in the history of science and technology that an object divides the world between those who understand how it works and those who do not.

People use AI without understanding it (although we are not dealing with strict categories here, but rather varying degrees of understanding – and acceptance). Most of us agree to taking planes, paying taxes, getting vaccinated, and undergoing surgery: we do not need to understand how these things work in order to use them. So why are there different requirements for algorithms today?

Of course, it is said that there is a moral risk, which is why it is necessary to clarify not the technological mechanics but the organizational mechanics of these digital tools. An explanatory effort must be made so that an epistemology of trust can be built. «[I]t is often impossible for an explanation to be completely faithful unless it is the complete description of the model itself» (Ribeiro et al. 2016, 3). Software, then, does not truly aim for explicability, but for interpretability. Transparency is not necessarily correlated with trust, quite the opposite: disclosure of the mechanism is not enough to restore any trust that may have been compromised. If, by definition, trust precisely concerns relationships in which one does not have complete knowledge, but in which trust is granted despite factual ignorance, it is quite natural that one cannot return to a state of full trust by means of a catalogue of empirical facts. Hence, certain affective dynamics – our experience of sensitivity and affect, that is, the emotional tone with which we inhabit the world – should be reintegrated into the discourse on the digital. In other words, it is a matter of engaging with the realm of the aesthetics of communication, where aesthetics does not refer to – or at least not primarily – art or the production of artifacts, but something inherent to perception: in this sense, ICTs can open or conceal the regime of the visible and provide us with access to the world – the world of the environment, the world of others and the world of the self. And that is why it makes sense to turn to the imaginary as a place where meaning is created.

4. AI imaginaries

So how can we create a symbolic space, and new imaginaries related to AI? First of all, it must be said that symbolic space is not the illusory complement of physical space, but rather the system of collective meanings that, while implicit, is able to guide the expectations, desires, and actual behaviors of subjects inhabiting the physical space. A symbolic

⁵ As stated by Noë: «we never wonder what a door handle is when we encounter one. The very fact that the question arises means that the usefulness of the handle has been compromised. If we notice a handle, it is potentially the result of poor design» (Noë 2015, 101).

space exists where the creative power of a *shared social imaginary* resides. Through this concept, which is also widely used in social sciences, we refer to a shared *habitus* on which individuals build their expectations, their specific ways of being in the world and of interacting with each other. Imaginaries therefore operate primarily at image level, on the basis of an associative grammar made up of resemblances and references, rather than formalized concepts and explicitly structured intellectual schemes.

As stated by Taylor:

By social imaginary, I mean something much broader and deeper than the intellectual schemes people may entertain when they think about social reality in a disengaged mode. I am thinking, rather, of the ways people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations. (Taylor 2004, 23).

Sheila Jasanoff has also provided a good definition of sociotechnical imaginaries: «We redefine sociotechnical imaginaries as collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology» (Jasanoff et al. 2015, 4).

The concept of the imaginary thus acquires two functions: the first is to explain the existence of a society (the imaginary is what *holds everything together* in a society), and the second is to explain the existence of historical change, i.e. the fact that there is historical change and not endless repetition. For individuals to live, the existence of reality is not enough: there must be non-reality, the ability to distance oneself from what is. In order to do so, one must be able to ignore reality, or rather, to let possibility exist.

Long before Jasanoff, Kim, Taylor and Anderson, Castoriadis – who notably influenced their theories – enables us to think of socio-technical imaginaries as a hinge between macro and micro levels. This allows us to refer to different levels of discourse simultaneously and through the figure of the instituting/instituted imaginary. For Castoriadis, the social imaginary is a primary structuring (Castoriadis 1975), in which distinctions are articulated about what matters to each individual and to communities, through a series of investments of intellectual, practical and affective nature. Castoriadis' relevance to this discussion lies in the fact that he sheds light on the generative matrix of imaginaries. «We encounter in history the imaginary as a continued origin, always current foundation, a central component where what holds society together and what produces historical change are generated» (Castoriadis 2007, 145 – my translation).

A concrete example of an instituted and instituent imaginary is law: in Castoriadis' words, «one finds a dawning recognition of the fact that the source of the law is society itself, that we make our own laws – whence results the opening up of the possibility of challenging and putting into question the existing institutions of society, which now is no longer sacred, or in any case not sacred in the same way as before» (Castoriadis 1993, 105). Law is the only discursive practice that produces the world it designates. It is everywhere and nowhere, and this omnipresence is given by the very relations that it institutes.

A human being, according to Castoriadis, is essentially an imaginative being, who produces, consumes, and loves images. In the same vein, human being is not seen at all a rational being, as tradition would have it, but rather as a being who imagines and fantasizes, capable of delirium and irrationality, and in this sense opposed to animals. As we can read in *L'imaginaire comme tel*: «An animal that lacks food looks for its food; if it does not find it, it weakens and eventually dies. A man who lacks food also weakens; but before dying,

he looks for something else, makes a stick, invents a trap, wages a war, or tells himself a story» (Castoriadis 2007, 150 – my translation).

According to Castoriadis, institutions exist only in the symbolic sphere, providing a form of stabilization, and it is in this sense that the instituted form of the state emerges. At the same time, however, the symbolic dimension is constantly in flux, which is why Castoriadis introduces the idea of the instituting alongside the concept of institution. The instituting refers to the perpetuation of the other in the radical imaginary and describes the moment when instituting society bursts into instituted society and creates itself as a new (instituted) society. Castoriadis seeks to demonstrate the inventive nature of the social being: from this perspective, radical imagination, on both the individual and collective level, appears as a constitutive, or rather, institutive force of reality. It is significant that, when taking stock of the May 1968 events, Castoriadis writes: «all this is evidently inconceivable without a reversal not only of the existing institutions, but even of what we mean by institution» (Castoriadis et al. 1968, 140 – my translation).

As Merleau-Ponty said when he outlined his philosophy of institution (during his lectures at the Collège de France, 1954-55), its aim is to understand the dynamics through which all of human existence unfolds. This does not only include collective history, but also the affections, dreams, and desires that incarnate themselves in an «instituted life» (Merleau-Ponty 2010, 30). Institutions which do not want to become rigid, must always operate in the following manner: they must allow the flow to express itself without dissipating, settling instead into partial representations. These, far from being separate, are seen as a collective act, manifested in a series, but rather schemes, figures, and symbols.

The theoretical reference to Castoriadis is particularly fruitful, in my opinion, because it helps us to distinguish imagination from the imaginary: the imaginary is not a subsequent addition to the natural world and its pre-formed structures. In this perspective, it is seen neither as a subjective faculty nor as a cultural superstructure to be dispensed with. In Castoriadis' view, imagination is original and instituting. Therefore, it brings things into existence. However, doing so as an independent form means giving value to objects in a network of meanings suitable for use. All of this reminds us of the importance of narrative as a constitutive part of any socio-technical imaginary. Keeping in mind the creative generative matrix of thought (understood as “creative rupture”) can help us to view the dominant contemporary imaginaries of AI (often disconnected from this technology's true state of the art) with skepticism. The way we envision AI is perhaps an aesthetic issue, but it also raises questions about the ethical and socio-political challenges we face.

The imaginary that we feed, shape, and nourish with images of AI is not something given once and for all, nor something that overwhelms us. If the image, as Foucault reminds us, is the oldest sign, the archaic sign, the *first sign* (Foucault 2008), it also represents *primitiveness* in the production of meaning and emotion. This is where we need to look in order to build a new epistemology of trust in AI.

5. Conclusions and possible directions for future research

The conclusions reached in the course of this discussion can be summarized as follows:

- a) Ethical-Political stakes of AI images: AI imagery is not a merely aesthetic issue; it also embodies ontological and ethical-political dimensions that demand scrutiny.
- b) Non-Representability of AI: Ontologically, AI-generated images expose the inherent difficulty – or impossibility – in fully representing the complexity of AI systems.

c) Analyzing AI images through the key categories of agency and visual regime (the dialectic between the visible and the invisible) can help to incorporate critical viewpoints into education and public discussion, so as to foster a more inclusive and thoughtful conversation about AI and its impact on society.

Some further research directions: human interaction is based on trust. Reframing AI imagery as an ethical-political challenge would foster this trust. I plan to explore on the practical implications of these theoretical findings in a future paper, by attempting to outline some guidelines for ethical AI imagery and actionable recommendations to help policymakers, educators, and AI developers build a less sclerotic and stereotypical imagery.

Bibliography

- Aiello, G. (2022). *Communication, Espace, Image*. Paris: Les Presses du Réel.
- Belting, H. (2011). *An Anthropology of Images: Picture, Medium, Body*. Princeton, NJ: Princeton University Press.
- Bredekamp, H. (2010). *Theorie des Bildakts*. Frankfurt a. M.: Suhrkamp.
- Castoriadis, C. (1975). *The Imaginary Institution of Society*. Engl. Trans. K. Blarney. Cambridge, MA: MIT Press.
- Castoriadis, C. et al. (1968). *Mai 68: La brèche. Premières réflexions sur les événements*. Paris: Fayard.
- Castoriadis, C. (1993). The Greek and the Modern Political Imaginary. *Salmagundi*, 100, 102-129.
- Castoriadis, C. (2007). *L'imaginaire comme tel*. Paris: Hermann.
- Cave, S. et al. (2020). *AI Narratives: A History of Imaginative Thinking about Intelligent Machines*. Oxford: Oxford University Press.
- Cave, S. & Dihal, K. (2020). The Whiteness of AI, *Philosophy & Technology*, 33, 685-703 (<https://doi.org/10.1007/s13347-020-00415-6>).
- Cocchiaro, M. Z. et al. (2024). Who Is an AI Ethicist? An Empirical Study of Expertise, Skills, and Profiles to Build a Competency Framework. *SSRN* (<https://dx.doi.org/10.2139/ssrn.4891907>).
- Crawford, K. & Paglen, T. (2021). Excavating AI: The Politics of Images in Machine Learning Training Sets. *AI & SOCIETY*, 36, 1105-1116 (<https://doi.org/10.1007/s00146-021-01162-8>).
- Derrida, J. & Stiegler, B. (2002). *Echographies of Television: Filmed Interviews*. Engl. Trans. J. Bajorek. Cambridge: Polity Press.
- Dorian, M. & Pousin, F. (eds). (2013). *Seeing from Above. The Aerial View in Visual Culture*. London-New York: I. B. Tauris.
- Foster, H. (1988). *Vision and Visuality*. Seattle, WA: Bay Press.
- Foucault, M. (2008). *This Is Not a Pipe*. Engl. Trans. J. Harkness. Berkeley, CA: University of California Press.
- Freedberg, D. (1989). *The Power of Images: Studies in the History and Theory of Response*. Chicago: University of Chicago Press.
- Gell, A. (1998). *Art and Agency: An Anthropological Theory*. Oxford: Oxford University Press.
- Grønstad, A. & Vågnes, Ø. (eds). (2019). *Invisibility in Visual and Material Culture*. London: Palgrave Macmillan.
- Jasanoff, S. & Kim, S-H. (2015). *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago: University of Chicago Press.
- Lyon D. (2007). *Surveillance Studies: An Overview*. Cambridge: Polity Press.

- Merleau-Ponty, M. (1969). *The Visible and the Invisible*. Engl. Trans. A. Lingis. Evanston, IL: Northwestern University Press.
- Merleau-Ponty, M. (2010). *Institution and Passivity: Course Notes from the Collège de France (1954-1955)*. Engl. Trans. L. Lawlor & H. Massey. Evanston, IL: Northwestern University Press.
- Mitchell, M. (2019). *Artificial Intelligence: A Guide for Thinking Humans*. New York: FSG (Farrar, Straus and Giroux).
- Mitchell, W. J. T. (2005). *What Do Pictures Want? The Lives and Loves of Images*. Chicago: University of Chicago Press.
- Noë, A. (2015). *Strange tools: Art and Human Nature*. New York: Hill and Wang.
- Paglen, T. (2014). Operational Images. *e-flux Journal*, 59; November 2014 (<https://www.e-flux.com/journal/59/61130/operational-images>).
- Rancière, J. (2004). *Disagreement: Politics and Philosophy*. Engl. Trans. J. Rose. Minneapolis, MN: University of Minnesota Press.
- Rancière, J. (2013). *The Politics of Aesthetics: The Distribution of the Sensible*. Engl. Trans. G. Rockhill. London: Bloomsbury.
- Ribeiro, M.T. et al. (2016). "Why Should I Trust You?" Explaining the Predictions of Any Classifier. *KDD '16 (Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining)*, 1135-1144 (<https://doi.org/10.1145/2939672.2939778>).
- Romele, A. (2022). Images of Artificial Intelligence: A Blind Spot in AI Ethics. *Philosophy & Technology*, 35 (4), 1-19 (<https://doi.org/10.1007/s13347-022-00498-3>).
- Romele, A. & Severo, M. (2023). Que veulent les images de l'IA? Une exploration de la communication scientifique visuelle de l'intelligence artificielle. *Sociétés & Représentations*, 55 (1), 179-201 (<https://doi.org/10.3917/sr.055.0179>).
- Rose, G. (2010). *Visual Methodologies: An Introduction to Researching with Visual Methodologies*. Thousand Oaks, CA: Sage.
- Taylor, C. (2004). *Modern Social Imaginaries*. Durham: Duke University Press.
- Vernant, J.-P. (1991). *Mortals and Immortals: Collected Essays*. Ed. F. I. Zeitlin. Princeton, NJ: Princeton University Press.
- Wheeler, M. (2022). Entre la transparence et l'intrusion des machines intelligentes. In: T. Reigeluth & S. Benlaksira (eds.), *Intelligence artificielle. Que faire de la transparence technique? (Revue de philosophie contemporaine, 2)* (13-29). Paris: Vrin.

Capturing the Sun

Solarpunk and the Elite Capture of Imagination

Alessio Gerola, Zoë Robaey

Abstract. *The climate emergencies of the last few years are making increasingly clear that unless the destructive and exploitative structures that support modern standards of living are dismantled and transformed, the future shall be a very hot and desolate one. Science fiction has offered a venue to reflect and envision possible futures in ways that engage our imagination and stimulate technological innovation. We argue that imagination can be understood as a collective capability that supports forms of resistance and resilience. This framing enables us to examine the consequence of the existence of power asymmetries, which may distort the potential of imagination to be a source of transformative change. To make our case, we reflect on solarpunk as a contemporary art and activism movement that envisions hopeful futures of ecological living. We argue that, as a subversive imaginary, solarpunk may be affected by processes of elite capture that could stifle its radical potential, particularly in relation to its visual identity. By reflecting on two emblematic cases, we illustrate how imagination can be captured in ways that damage its political potential. Our contribution shows that even well-intentioned or apparently innocuous uses of forms of imagination and imaginaries can have reactionary political consequences that normalize and neutralize narratives in support of radical change. Analyzing the risk of capture of sustainable future imaginaries such as solarpunk is relevant for the study of the multiple narratives, visual, literary, and academic, that are at play in public debates on the sustainability transition and climate change mitigation and adaptation, and their political consequences.*

Keywords. Imagination, capability, elite capture, solarpunk.

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1. Introduction

The climate emergencies of the last few years are making increasingly clear that unless the destructive and exploitative structures that support modern standards of living are dismantled and transformed, the future shall be a very hot and desolate one. However, imagining alternatives that could actually move the present out of the current predicament is easier said than done. Mark Fisher famously wrote how it is easier to imagine the end of the world than the end of capitalism (Fisher 2009, 32). Amitav Ghosh attributes this

challenge to the way in which modernity, through science and rationalism, has rendered certain scenarios appear so unlikely to the point of becoming unthinkable (Ghosh 2016). It is not hard to imagine alternatives per se; rather, it is nearly impossible to take them “seriously” as real possibilities. In a world that proceeds by predictable laws, truly revolutionary alternatives are considered flights of fancy at best. Despite this challenge, art and literature have been engaging with the climate crisis to envision and inspire strategies towards possible futures as well as warning against the dire consequences of continuing business as usual. Climate fiction is a genre that has been picking up a steadier pace in science fiction, from Octavia E. Butler’s 1993 *Parable of the Sower* to Kim Stanley Robison’s 2020 *The Ministry for the Future*, and movies such as Roland Emmerich’s 2004 *The Day after Tomorrow* and Dean Devlin’s 2017 *Geostorm*. These works imagine futures of extreme climate instability and the – often vain – human efforts to control them (Goodbody & Johns-Putra 2019; Trexler 2015). While climate fiction encompasses a wide variety of genres, from the post-apocalyptic adventure to the psychological thriller, several of these works feature advanced technologies of geoengineering and the dystopian aftermaths of their mishaps. They thus offer cautionary tales of the dangers that lie ahead of current Promethean paths of climate manipulating through advanced technology.

New trends in science fiction, however, have attempted to give voice to more positive visions of ecological futures that entail a radical political rethinking of human relations with nature and technology, providing new imaginative energy for transformative political projects (Jameson 2007). Solarpunk has been affirming itself as an emerging speculative movement in fiction, art and activism, that offers hopeful alternatives of habitable futures in the midst of environmental collapse and climate chaos (Reina-Rozo 2021). Taking its name from similar genres such as cyberpunk, steampunk, and dieselpunk, solarpunk attempts to reinject the future with hope by emphasizing radical decentralization, community empowerment through bottom-up innovation and the extensive use of renewable energies and sustainable technologies (Hunting 2020). Born online on blogging platforms around the 2010s, Solarpunk appeared in print for the first time in Portuguese in a Brazilian anthology (Lodi-Ribeiro 2012). Solarpunk’s anarchic and communitarian futures attempt to decentralize techno-ecological imaginaries from American and European centers to areas usually considered at the peripheries of innovation and the future, as well as from the places where technology and innovation are supposed to come from, such as university laboratories and industry. For example, Italian author Francesco Verso’s novels set in the narrative world of *The Roamers* and *No/Mad/Land* feature a nomadic group of maker-heroes and maintainers, the «Pulldogs», who travel the world helping marginalized communities empower themselves to become energetically independent and to repair pollution and ecological degradation that plague their environment (Verso 2023; 2024).

This ambition, however, is threatened by the increasing popularity of the genre, which risks blurring the lines that separate it from the Promethean imaginaries of ecomodernism, a vision for a future sustainable civilization based on the decoupling of economic activities from ecological impacts thanks to scientific breakthroughs and large-scale advanced technologies such as geoengineering (Asafu-Adjaye et al. 2015). Part of the reason for such confusion might lie in the ambiguity of sustainable technologies such as green buildings, vertical agriculture, and solar energy, which stand as hopeful imaginary symbols of greener futures but also hide darker and very concrete sides of green extractivism and colonialism (Lang et al. 2024; Roos & Hornborg 2024). Are offshore wind farms solarpunk or ecomodernist? Analyzing a technology in isolation might do little in the way of offering an answer. However, the eco-futurist scenarios of ecomodernism, focused on growth, centralized innovation, and the anthropocentric control of nature, are premised upon very different political and economic assumptions from solarpunk, which is premised on anarchic, ecological, and socially just futures (Gillam 2023). It is this ambiguity between different sustainable

technologies and their political implications that makes solarpunk-inspired innovation and imagination products at risk of appropriation and misinterpretation.

Highlighting these differences is essential because technological imaginaries are not neutral, as they may be an expression of and an influence on current scientific and technological developments (Jasanoff & Kim 2015; Morozov 2013). Cyberpunk narratives such as *Ghost in the Shell* and *The Matrix* may have been a source of inspiration for Silicon Valley investments in computer and AI research, in the hope of achieving such products of imagination as Artificial General Intelligence (AGI), sentient robots, and brain-computer interfaces. Space operas, such as Stanley Kubrick's 1968 masterpiece *2001: A Space Odyssey*, might have seduced private and public fantasies of interplanetary civilization.¹ Similarly, technological imaginations of sustainable futures powered by solar sails, biorobots, and closed-loop artificial ecosystems could provide inspiration for researchers, engineers, designers, and activists searching for alternative modes of living (Gerola et al. 2023; MacKinnon et al. 2020).

If it seems plausible that technological imaginations have a social role in providing visions of desirable futures, it is most certain that there are vast inequalities in terms of how much different social actors can do to actually bring about those futures. Underfunded open software collectives might easily be outcompeted, technologically and economically, by big tech companies in terms of impact on the digital market. The existence of power relations thus extends to the sources of imagination that inspire different actors, creating distorting effects on imaginative efforts. American philosopher Olúfemi O. Táíwò calls «elite capture» societal processes through which attempts at radical transformation are inhibited through their appropriation by powerful actors (Táíwò 2022). These elites, in turn, may enact symbolic acts of rebranding to avoid deeper structural reforms or might frame subversive instances as perverse attempts to be condemned and repressed. We aim to show that this can be the fate of subversive technological imaginaries as well, including solarpunk. Elite capture offers a useful critical lens to make sense of social and cultural processes whereby influential actors such as technology companies appropriate and distort transformative attempts of re-imagining techno-ecological futures.

Understanding the processes and effects of imagination capture is important in order to critically examine contemporary discourses on technological innovation and highlight potential dangers of technosolutionism, green washing and other counterproductive outcomes (Illich 1975). Current debates on the sustainability transition, ecological modernization and degrowth approaches illustrate the ambiguity of sustainable innovation and the different technologies that are supposed to herald them (Kothari et al. 2019).

We begin by discussing the role of imagination as a collective capability. We then turn to elite capture and reflect on how it can distort the political value of imagination. The third section will present two cases of solarpunk art and analyze the broader implications of their capture through their display as corporate commercials. The conclusion will reflect on what we can learn from these cases about processes of appropriation of technological imagination.

2. Imagination and ethics: who gets to imagine the future, and how?

Imagination is a multi-faceted concept. While often conceived as a skill, we argue that understanding imagination as a collective capability aimed at envisioning a range of possible futures can highlight its ethical and political role in supporting citizens' relationships to

¹ Including the ambitious project of imaginative resistance of a Zambian space program led by researcher Edward Makuka Nkoloso (see Wilson 2019).

technological futures. In this section we build upon a variety of scholarship on imagination to argue for an account that emphasizes its role as a capability that enables the generation of an open and dynamic plurality of transformative future pathways, a role that can be threatened by processes of elite capture.

Philosopher of mind Amy Kind has discussed imagination extensively, as well as edited an important volume on the philosophy of imagination (Kind 2016). This indicates that there are multiple conceptual starting points when considering imagination. For our argument, we move from Kind's work in understanding imagination as a skill that can be practiced through engaging with fiction and that produces coherent and value-laden mental images (Kind 2022). The process of imagining is a deeply social and political phenomenon, conditioned by culture, society, the availability of works of fiction and so on. According to Kind, imagination has a moral role. She argues that «fiction exposes us to a wider range of experiences than we would otherwise have an easy opportunity to connect with, and it does so in a safe context that proves especially conducive to imaginative practice» (Kind 2022, 7). Here, the primary role of imagination is the ability to become empathetic, through what Kind describes as «experiential imagination», the ability to project oneself in an imagined situation, its experiences and feelings. Additionally, «propositional» and «sensory» imagination enable us to expand one's imagination through the creation of mental images and other sensory experiences, making one's experience of fiction more vivid and present. According to Kind, «the more elaborate the descriptions encountered, the more elaborate the mental images are that readers will likely be producing, and thus the more that imagination is stretched» (Kind 2022, 14).

To rephrase Kind's proposal, one can say that if imagination is a skill that allows us to conceive of different futures, where propositional imagination, or imagination about what could be, plays an important role, then there is a need to keep imagination as open as possible to various futures. This relates to Mark Johnson's work on moral imagination (Johnson 1993), where moral imagination supports moral agents in solving an ethical problem by conceiving of a range of options. This range of options might, however, be limited by political, social and economic circumstances, in other words, power asymmetries.

In *Imagination: A Manifesto*, sociologist Ruha Benjamin writes on how imagination can be reclaimed under power asymmetries. In her chapter on imagining the future, she critically discusses these power asymmetries, arguing that «a critical approach to imagination requires us to consider that the way forward is never guaranteed to be better than the present» (Benjamin 2024, 104). This calls for a democratic approach to imagination. Benjamin, referring to indigenous children in the Marshall Islands, writes «whether we turn to children playing in the sand or tech billionaires offering us solutions while they build underground bunkers to survive the climate emergency, it matters whose imaginations get to materialize as our shared future» (Benjamin 2024, 119). In other words, the existence of power asymmetries makes it so that different groups have unequal access to the creation of imaginations products (such as movies, books, comics, shows, public talks) that can give shape to concrete social, political, and technological consequences, inequalities that raise the need for a broader access to the ability to participate in shaping collective imaginaries. This is a crucial point we will address by examining the production of solarpunk visual art later in the paper.

Summarizing our argument so far, imagination can be seen as a skill, enhanced by fiction, to envision alternative ways ahead, a multiplicity of open futures that are affected by existing power asymmetries and that can challenge or reinforce dominant imaginaries. As such, imagination is a skill of fundamental ethical and political importance for its collective implications as a force that has the power to push for systemic change, but one that is also at risk of being co-opted to reinforce already dominant imaginaries, as we will see in the next section.

First, however, the notion of skill is not yet adequate for our argument, as it denotes a characteristic defined by a single individual's ability. Given the importance of imagination for transformative processes of collective change, we propose a complementary perspective. Building on the work of Fletcher (2016), we argue that conceiving of imagination as a capability, rather than as an individual skill, could address some of the challenges that stem from the social and political role that imagination can play. Indeed, for imagination to be a capability, one is required to acknowledge the limits of one's own experiences, find points in common with others, and doing so leads to embracing plurality (Fletcher 2016, 397). This too, however, has limits as it can tend to overburden moral agents in vulnerable positions. As an individual, it is also easier to engage in exercises of transformative imagination, but it is often not in one's interest when in a position of power. Solarpunk's emergence as a radically subversive discourse around democracy, technology and sustainability implies that it is at risk of being co-opted, intentionally or otherwise, by dominant narratives on sustainable development instead of challenging them by offering alternative visions. What is needed is an understanding of the role of imagination, intended as a capability that opens up a plurality of multiple futures, that grounds this ability in the social dimension of imagination practices and products.

In other works, Robaey and Hase Ueta suggest that by nature imagination cannot be an individual capability but needs to be understood as a collective capability (Robaey and Hase Ueta 2024). This brings us to the last conceptual piece of the puzzle regarding how we understand imagination in this paper. Rosignoli (2018) explains that collective capabilities are gained when an individual lacking a capability acquires it by joining a group: «the expansion of citizens' capabilities (i.e. their access and opportunity to do things that they have reason to value) can be better pursued by enhancing collective agency» (Rosignoli 2018, 825). Joining a group to acquire collective capabilities allows the development of resistance and resilience. There is more to her account, but for the sake of our argument, it suffices to take her definitions: resistant capabilities are the «collective ability to resist to structural injustices, such as top down decisions imposed by authorities upon groups», and resilient capabilities the «collective ability to react constructively to structural injustices, including collective actions taken by groups aimed at expanding their freedoms» (Rosignoli 2018, 830). Rosignoli points out that early work on collective capabilities was done in accounting for the efforts of indigenous movements in struggling for environmental justice.

By conceptualizing imagination as a collective capability that enables groups to resist and react to structural injustices through creative acts that can inspire and guide societal transformations, we can problematize the social and political implications of the creation of mental images, social imaginaries, and other products of imagination through fiction. By focusing on imagination as a collective capability, we are now in a better position to evaluate the potential and limitations of solarpunk as an imaginative endeavor that envisions transformative change towards more just ecological futures. Before turning to our case studies, we turn to consider how imagination can fail to deliver its liberatory promises.

3. The limits of imagination: elite capture

As we have seen, imagination can offer a powerful resource to envision alternative futures. The translation of imagination into fiction and other speculative visions is essential to give focus to transformative projects that challenge existing processes and institutions considered unjust or unsustainable, and to empower communities with clearer visions of the future. As other material and immaterial resources, however, imagination is at risk of being co-opted and controlled by powerful social groups and institutions, intentionally or otherwise. Companies might engage in deceitful branding by making false, weak, or

unverifiable claims to protect nature in order to appeal to environmentally sensitive customers, while not addressing substantial needs for reform e.g. in net emissions or exploitation of indigenous land. American philosopher Olúfemi O. Táíwò described similar sorts of counter-productive exercises in legitimization as «elite capture» (Táíwò 2022). It is upon this notion that we build our argument in order to reflect on the ways in which imagination can be captured and distorted, thereby stifling the radical potential of transformative imaginative projects.

The notion of elite capture originated in development studies to indicate how local elites and international aid organizations tend to intercept financial benefits meant for the broader society (Musgrave & Wong 2016; Shapland et al. 2021). Táíwò expanded the idea of elite capture to indicate «how public resources such as knowledge, attention, and values become distorted and distributed by power structures» (Táíwò 2022, 10). We argue that imagination, as a collective capability, constitutes a public resource that can be similarly exploited. According to Táíwò, elite capture is one of the main tools through which companies and institutions might resist substantial reform by enacting mere aesthetic or symbolic changes. Táíwò illustrates this process through the troubled history of «identity politics», an idea born as a community-based project of societal empowerment in the 1970s through the Black Feminist Combahee River Collective and turned into a legitimization tool for companies' diversity policy (Táíwò 2022, 6-9). The outcome of elite capture is ultimately the stalling of transformative change through performative acts of rebranding or through active repression by labeling subversive instances as contrary to the public good. «In the absence of the right kind of checks or constraints, the subgroup of people with power over and access to the resources used to describe, define, and create political realities – in other words, the elites – will capture the group's values, forcing people to coordinate on a narrower social project that disproportionately represents elite interests» (Táíwò 2022, 32). In this way, the power of transformative projects and visions is neutralized and converted into legitimacy claims by capturing elites.

Elite capture does not constitute an isolated occurrence, but a systemic phenomenon of large and complex societies, in which inclusive political projects tend to be hijacked by groups in positions of privilege. In the case of media, for example, «those atop the attention economy exert the most influence over how the critical resources of attention and engagement are distributed» (Táíwò 2022, 58), thereby heavily shaping the focus of online debates. Elite capture is thus a phenomenon larger than occasional opportunism and appropriation, as it is not limited to the scope of the agents' intentions, and it has wide ranging political and economic effects.²

We argue that imagination and its products are at risk of similar processes of elite capture that inhibit their transformative potential. If imagination is conceived as a collective capability, a capability which enables the envisioning of alternative states of things and guide change, it becomes clear how elite capture can interfere with the potential of imagination to foster resistance and resilience. Through the diversion of attention, appropriation of styles and motifs, misrepresentation, and the flattening of nuanced narratives, cultural elites and commercial companies may appear to promote diversity and inclusion while actually disempowering marginalized groups from envisioning and enacting their transformative futures. Imagination can thus be captured via the use, production, and distribution of products of imagination, such as fiction and visual aesthetics, with the implicit or explicit

² Described in these terms, elite capture might appear similar to cultural appropriation. However, cultural appropriation is typically intended as a narrower and episodic phenomenon that concerns the inappropriate use and display of cultural elements of minority groups by part of dominant groups. Their similarity consists in being processes of expropriation of benefits, social and economic, from subaltern to dominant groups, but they concern different objects and scope.

effect of legitimizing a particular company or institution through appeals to diversity, sustainability and similarly positive values, while discouraging actual efforts for change.

Before moving to our analysis of solarpunk commercials, we need to stress that elite capture constitutes just one process in which the promises of imagination as a collective capability are negated. As elite capture can happen with different sorts of resources, financial or imaginative, material or immaterial, so imagination as a process and a product can enhance or prevent transformative change depending on who and how is wielding it. Amitav Ghosh (2016) highlights how existing imaginaries, such as the fantasy of a stable nature in the Holocene, can stifle the creation and believability of new stories, in particular concerning exceptional events such as climate change. It is telling that solarpunk is considered a subgenre of science fiction, a genre typically considered not artistically “noble”, rather than, say, a form of dramatic or didactic fiction. Similarly, Ruha Benjamin (2024) spends several chapters discussing how the oppressive and eugenic imaginaries of capitalism, long-termism, and nationalism privilege the benefits of an imagined group that mostly includes the elites, instead of the real suffering of people surviving at the margins. When the imaginaries of dominant groups capture the efforts and products of imagination coming from the margins, this often results in the derision, demonization or depoliticization of those instances. Thus, solarpunk imaginaries risk ending up either ridiculed for their unfeasibility, blamed as threats to civil and economic order or co-opted as supporting high tech and capitalist eco-modernism, as we will see below.

4. Capturing the sun: two emblematic solarpunk commercials

To make the case for the possibility of elite capture of imagination, we turn to examining two cases of solarpunk-inspired commercials as illustrative examples. Solarpunk is a contemporary speculative art, science fiction, and activism movement that envisions hopeful futures of harmonious living with nature. It originated on internet blogs around the 2010s to describe a vision of the future that did not yet exist and to coalesce the efforts of artists, visionaries and activist to imagine and bring that world to reality, spurring the creation of a manifesto and numerous community initiatives around the world (The Solarpunk Community 2019; Hudson 2015). The daring gamble of solarpunk as a joint effort in speculative imagination and transformative change is to envision ways of addressing current socio-ecological injustices by actively intervening through sustainable technology and communitarian self-organization (Gillam 2023; Reina-Rozo 2021). This goal entails the radical decentralization and democratization of access, manufacture, and control of technologies such as renewable energies, bio-based materials, urban farming, and 3D-printed modular design, to name a few prominent examples (Hunting 2020). Solarpunk represents the attempt to rethink technological solutions to environmental problems by filling in the gaps left by governments and institutions through the empowerment of local communities by means of up-cycling, retrofitting, frugal innovation and other informal and convivial modes of technological development (Illich 1975). The fact that solarpunk has initially taken root in South America (Lodi-Ribeiro 2012) and among self-organized eco-villages and anarchic collectives might be emblematic of the ethos of resistance and resilient response to a sense of political, technological, and ecological abandonment, finding empowerment through collective imagination. For example, Brazilian author Jana Bianchi’s short story *Vanishing Tracks in the Sand* illustrates these dynamics through the resilience of a coastal community in Brazil, caught between environmental disasters, governmental abandonment and bureaucratic encroachment through “development” projects that undermine local autonomy and threaten the existence and way of life of its people (Bianchi 2023).

The transformative potential of solarpunk as an exercise in imagination for resistance and resilience is however fragile. Solarpunk is still an evolving genre, with numerous discussions concerning its identity and subtypes. It is thus sensitive to capture by firms and institutions that may adopt solarpunk-ish themes and tropes such as solar panels and green buildings to promote themselves as close to nature and to the people. The risk of co-optation is compounded by the risk that solarpunk imaginaries come to be shaped in turn by these more dominant and influential actors, inhibiting the radical political message at the core of the movement and shifting its focus to imagining sustainable technofixes.

To examine how solarpunk visual aesthetics might be captured, we discuss two solarpunk-inspired commercials that have gained much attention due to their prominence. It is noteworthy that both artworks were also designed as advertisements representing the goals of private companies that strive to share their visions on the role of technology in farming in one case, and on biomanufacturing in the other case. Tellingly enough both ads are from the same year, and by the same artist – this fact was not known to the authors upon selection of these cases.

The first case is offered by one of the most popular visual representations of solarpunk, originally a commercial by dairy company Chobani, which online communities have elected as one of the best instances of a solarpunk world. Titled *Dear Alice*, it is described as «a love letter from a grandmother to a granddaughter» that offers «an optimistic vision of the future of farming» and «a nostalgic look towards a new era of agriculture» (The Line Animation Studio 2021). In the video we see an idyllic landscape, lush green and fertile, dotted by shining solar panels, floating wind turbines, and green skyscrapers in the distance, which might be more representative of ecomodernist ideas of human-nature separation (Balkan 2024). The protagonist is a woman who inherited her farm from her grandmother, using advanced technologies to care for the land and feed her multiethnic family. The smart farm of a small producer, nostalgic and romantic views of old brick ovens and family meals in the shade of orchard gardens are juxtaposed to sleek and clean looking smart fridges, agricultural robots, small-scale irrigation-through-climate-manipulation technologies. Innovation and tradition build upon each other and co-exist in a multiethnic and multi-species collective. The score was composed by Japanese composer Joe Hisaishi, long-time collaborator of Studio Ghibli. A “decommodified edition” was uploaded on YouTube in the fall of the same year, removing the company’s name from the video. Since then, Ghibli aesthetics has become a powerful visual element in Solarpunk imaginaries.

A second case of visual capture of solarpunk aesthetic can be seen on the billboard pictures used by American biotechnology company Ginkgo Bioworks when the company joined the New York Stock Exchange in September 2021. The «organism company», as they call themselves, was founded by MIT scientists with the aim of enabling synthetic biology companies to “grow” any kind of product starting from basic DNA blocks and bioengineered organisms. The company announced their rating on the New York Stock Exchange through giant visual displays appearing in Times Square and on the Wall Street building. They showed forested landscapes and green glass buildings populated by people peacefully co-existing with dinosaurs, a clear hint to *Jurassic Park* fantasies of the power of genetic engineering. A green, sustainable, and exciting future became possible through the company’s work. The successful visual campaign led to the creation of a solarpunk jigsaw puzzle of the same picture. As the company advertises «Daniel Clarke was commissioned to create this solarpunk imagery, where humans, nature, and technology interact peacefully, evoking a sense of wonder and awe» (Ginkgo Bioworks 2021). The same artist collaborated with the dairy company to produce the *Dear Alice* short.

These examples perfectly illustrate how the problem of elite capture is a problem of power asymmetries. When a dominant group produces imaginaries that seemingly incorporate those of marginalized groups, this dilutes their subversive and transformative goals,

thwarting the potential of imagination as a capability of collective resistance and resilience. Here we see industrial corporations from the Global North who employ charming and idyllic visual tropes, reminiscent of tranquil agrarian landscapes, adding an eco-futuristic spin that makes them exciting visions for a high-tech green future. This combination of tradition and innovation makes them undoubtedly *feel* solarpunk, yet they clearly lack all the political motives that animate the movement. These visuals hide the contested nature of sustainable future imaginaries, exciting the public's imagination in a direction that is favorable to the commercial and technological projects of these companies. By not depicting power struggles, these images do not engage imagination as a capability for collective resilience and resistance. Rather, they portray the future as harmonious and without conflict, implicitly contributing to frame solarpunk projects of community empowerment and active resistance as degenerate and subversive, or as dreamy fantasies of unrealistic futures. This shows that the elite capture of transformative technological imaginaries may produce a future that appears peaceful and uncomplicated, more the concern of depoliticized technological solutions than of transformative political engagement.

It is important to nuance our analysis here – we take these ads as a means to reflect on the capture of imagination, which as we specified goes beyond actors' intentions. While these companies might not be aware of contributing to co-opt and deform solarpunk narratives, our analysis offers an argument to call them to responsibly communicate about potential futures, especially when borrowing tropes from politicized genres such as solarpunk. Collins (2020) argues that there is no overdemandingness of collective agents such as businesses. What this essay suggests is that fiction, as a vehicle for imagination, might best be used in representations that encapsulate imagination's goals of expanding our horizons and collective capacity for resilience and resistance.

Additionally, discussing elite capture demands honest self-reflection. As Shapland et al. clarify, this «is a fraught exercise because we are vulnerable to reaffirming symbols and entrenched power relations when we consider issues of empowerment and capture, as we tend to see them within frameworks that legitimize the existing relations of domination» (Shapland et al. 2021, 81). Our access to solarpunk resources of imagination is situated in a Western European context, where there is generally ample opportunity and resources for community initiatives, which are often spurred by a sense of possibility rather than the urgency of necessity or neglect. Our own understanding and discussion of the imaginative possibilities of solarpunk is therefore not free of potentials distortions and risks of capture in relations to contexts and people affected by different circumstances.

5. Conclusion: capturing imagination

Through the visual examples of solarpunk we aimed to illustrate the subtle shifts in narratives and power involved in the elite capture of imagination, showing that images can take on a political life of their own and which philosopher Chiara Bottici has called the «imaginal» (Bottici 2014). By understanding imagination as a collective capability, this process of capture may contribute to stalling its transformative potential in fostering resistance and resilience. When imagination is used as a vehicle to fuel radically alternative technological futures, elite capture redirects attention in support of existing institutions and current views about nature, technology, and progress. In the cases we examined, the visual focus on advanced technologies and the marvelous worlds they enable shifts the attention from political and ecological questions, central to solarpunk, to technological issues. This ambiguity, as we noted, is at the heart of the debate on sustainable development and its alternatives. Analyzing the risk of elite capture of solarpunk imagination provides a valuable angle to study the multiple narratives, visual, literary, and academic, that are at play in public

debates on the sustainability transition and climate change mitigation and adaptation. This process of capture may constitute a distorting effect in political discussions around global justice issues in just transitions and the risk of green extractivism, lending support to technocentric narratives and defusing attention around alternative socio-ecological transitions. Our analysis shows that even well-intentioned or apparently innocuous uses of forms of imagination and imaginaries can have potentially reactionary political consequences that normalize and neutralize narratives in support of radical change.

We would like to conclude by reflecting on potential suggestions to engage more critically with solarpunk-inspired sources of imagination. Our discussion has emphasized how some solarpunk artworks tend to forefront an eco-futurist sense of marvel, ignoring the messy aspects of social contexts. They might draw superficial inspiration from visionary mega-projects of green architecture such as those by architects Vincent Callebaut and Stefano Boeri. A counterpoint might be offered by an emphasis on the sense of place of a local community. Belgian artist Dustin Jacobus has illustrated solarpunk-inspired makeovers of existing urban areas with a dearth of vegetation and water, envisioning place-based projects of urban transformation. Both approaches may inspire different ways to imagine better ecological futures, but we encourage the need for critical engagement with the different dimensions, social, ecological, technological, suggested by these imaginative visions. The risks may be assuming technological solutions to be the default way forward on the one hand and romanticizing frugal innovation on the other.

Bibliography

- Asafu-Adjaye, J. et al. (2015). *An Ecomodernist Manifesto* (<https://www.ecomodernism.org/manifesto-english>).
- Balkan, S. (2024). Electric Ladyland: Anticolonial Solarpunk as Infrastructural Resistance in Two Works of Speculative Fiction. *ISLE: Interdisciplinary Studies in Literature and Environment*, isae043 (<https://doi.org/10.1093/isle/isae043>).
- Benjamin, R. (2024). *Imagination: A Manifesto*. New York: W.W. Norton & Company.
- Bianchi, J. (2023). Vanishing Tracks in the Sand. Engl. Trans. R. Amoruso. In F. Verso (ed.), *The Bright Mirror: Women of Global Solarpunk* (185-207). Rome: Future Fiction.
- Bottici, C. (2014). *Imaginal Politics: Images Beyond Imagination and the Imaginary*. New York: Columbia University Press.
- Collins, S. (2020). How Much Can We Ask of Collective Agents? *Canadian Journal of Philosophy*, 50 (7), 815-831 (<https://doi.org/10.1017/can.2020.42>).
- Fisher, M. (2009). *Capitalist Realism: Is There No Alternative?* Winchester, UK: Zero Books.
- Fletcher, N. M. (2016). Imagination and the Capabilities Approach. In A. Kind (ed.), *The Routledge Handbook of Philosophy of Imagination* (392-404). New York and London: Routledge.
- Gerola, A., Robaey, Z. & Blok, V. (2023). What Does it Mean to Mimic Nature? A Typology for Biomimetic Design. *Philosophy & Technology*, 36, 65 (<https://doi.org/10.1007/s13347-023-00665-0>).
- Ghosh, A. (2016). *The Great Derangement: Climate Change and the Unthinkable*. Chicago: The University of Chicago Press.
- Gillam, W. J. (2023). A Solarpunk Manifesto: Turning Imaginary into Reality. *Philosophies*, 8 (4), 73 (<https://doi.org/10.3390/philosophies8040073>).
- Goodbody, A. & Johns-Putra, A. (eds). (2019). *Cli-Fi: A Companion*. Oxford: Peter Lang.

- Hudson, A. D. (2015). On the Political Dimensions of Solarpunk. *Medium*, Oct. 15, 2015 (<https://medium.com/solarpunks/on-the-political-dimensions-of-solarpunk-c5a7b4bf8df4>).
- Hunting, E. (2020). Solarpunk: Post-Industrial Design and Aesthetics. *Medium*. (<https://medium.com/@erichunting/solarpunk-post-industrial-design-and-aesthetics-1ecb350c28b6>).
- Illich, I. (1975). *Tools for Conviviality*. Glasgow: Fontana.
- Jameson, F. (2007). *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions*. London: Verso Books.
- Jasanoff, S. & Kim, S. (eds). (2015). *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago: The University of Chicago Press.
- Johnson, M. (1993). *Moral Imagination: Implications of Cognitive Science for Ethics*. Chicago: The University of Chicago Press.
- Kind, A. (2022). Fiction and the Cultivation of Imagination. In P. Engisch & J. Langkau (eds.), *The Philosophy of Fiction: Imagination and Cognition* (262-281). London and New York: Routledge.
- Kind, A. (ed.). (2016). *The Routledge Handbook of Philosophy of Imagination*. London and New York: Routledge.
- Kothari, A. et al. (eds). (2019). *Pluriverse: A Post-Development Dictionary*. New Delhi: Tulika Books.
- Lang, M. et al. (2024). Lucrative Transitions, Green Colonialism and Pathways to Transformative Eco-social Justice: An Introduction. In M. Lang et al. (eds), *The Geopolitics of Green Colonialism* (1-24). London: Pluto Press.
- Lodi-Ribeiro, G. (organizado por). (2012). *Solarpunk. Histórias ecológicas e fantásticas em um mundo sustentável*. São Paulo: Editora Draco.
- MacKinnon, R. B. et al. (2020). Promises and Presuppositions of Biomimicry. *Biomimetics*, 5 (3), 33 (<https://doi.org/10.3390/biomimetics5030033>).
- Morozov, E. (2013). *To Save Everything, Click Here: The Folly of Technological Solutionism*. New York: PublicAffairs.
- Musgrave, M. K., & Wong, S. (2016). Towards a More Nuanced Theory of Elite Capture in Development Projects. The Importance of Context and Theories of Power. *Journal of Sustainable Development*, 9 (3), 87-103 (<http://dx.doi.org/10.5539/jsd.v9n3p87>).
- Reina-Rozo, J. D. (2021). Art, Energy and Technology: the Solarpunk Movement. *International Journal of Engineering, Social Justice, and Peace*, 8 (1), 47-60 (<https://doi.org/10.24908/ijesjp.v8i1.14292>).
- Robaey, Z., & Hase Ueta, M. (2024). Imagination as a Collective Capability for Sustainability Transformations, *14th Braga Meetings on Ethics & Political Philosophy*, (https://14bragameetings.weebly.com/uploads/1/5/4/2/15425470/book_of_abstracts_-_14th_braga_meetings.pdf).
- Roos, A. & Hornborg, A. (2024). Technology as Capital: Challenging the Illusion of the Green Machine. *Capitalism Nature Socialism*, 35 (2), 75-95 (<https://doi.org/10.1080/10455752.2024.2332218>).
- Rosignoli, F. (2018). Categorizing Collective Capabilities. *Partecipazione e conflitto*, 11 (3), 813-837 (<https://doi.org/10.1285/i20356609v11i3p813>).
- Shapland, P. et al. (2021). How the Elite Capture Critique Is Used to Legitimise Top-down Control of Development Resources. In D. Ludwig et al. (eds), *The Politics of Knowledge in Inclusive Development and Innovation* (80-103). London and New York: Routledge.
- Táiwò, O. O. (2022). *Elite Capture: How the Powerful Took Over Identity Politics (and Everything Else)*. London: Pluto Press.
- Trexler, A. (2015). *Anthropocene Fictions: The Novel in a Time of Climate Change*. Charlottesville, VA: University of Virginia Press.

- The Solarpunk Community (2019). A Solarpunk Manifesto. In *Regenerative Design* (<https://www.re-des.org/es/a-solarpunk-manifesto/>).
- Verso, F. (2023). *The Roamers*, Engl. Trans. S. McCorry. New York: Simon and Schuster.
- Verso, F. (2024). *No/Mad/Land*, Engl. Trans. S. McCorry. New York: Simon and Schuster.
- Wilson, P. (2019). The Afnaut and Retrofuturism in Africa. *ASAP/Journal*, 4 (1), 139-166 (<https://doi.org/10.1353/asa.2019.0016>).

Web Resources

- Ginko Bioworks, (2021). Solarpunk Puzzle. (<https://www.growbyginkgo.com/products/solarpunk-puzzle/>).
- The Line Animation Studio. (2021). *Dear Alice*. (<https://www.thelineanimation.com/work/chobani>).

Comic Ideas

Reimagining Philosophical Practice in the Digital Age

Giacomo Pezzano

Abstract. *The paper claims that our increasingly visual mediascape opens up the possibility of imagining new ways of doing philosophy that take place through the medium of image at least as much as through the medium of word. Section 1 introduces the general question of the change of habits associated with the transition from page/word to screen/image, challenging the traditional skepticism regarding the cognitive reliability of images. Section 2 discusses the limits of the idea that screens are unavoidably destined to have a lethal impact on philosophical thinking, emphasizing how this conviction risks excluding philosophy from the novel cognitive ecology cultivated by the internet. Section 3 examines the conditions of possibility of «comicepts» – philosophical concepts created and communicated by leveraging the specific features of comics as a medium. Section 4 concludes by making a plea for a more liberal and inclusive philosophical practice based on the decoupling of “concept” and “verbal concept”.*

Keywords. Comics, Visual Thinking, Screen, Media Philosophy, Word and Image.

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1. Introduction: From Page/Screen to Word/Image

It seems no exaggerated to say that human cognition, as well as the human *ethos* more in general, is currently changing in such a way that its privileged surface is less and less the page and more and more the screen. In a short but very dense book discussing when and how the idea of a text became a full cultural object and the textbook habits were settled, Illich (1993) announced – firmly but not nostalgically – that «the book has now ceased to be the root-metaphor of the age; the screen has taken its place», since with the diffusion of various visual codes «the alphabetic text has become but one of many modes of encoding something» (Illich 1993, 3). At that period, the screen was that of the first kinds of rudimentary PCs, but times have run very fast since then, leading to personal devices such as tablets, smartphones, smartwatches, visors, and the like, which – not being confined to a unique fixed use – are «hypotelic» rather than «hypertelic» (borrowing the terms from Simondon 2017, 53-59). In other words, the multifunctionality and representational plasticity of the screen make such devices «super-artifacts» (Fasoli 2018): through a screen you can write a text, book a flight, buy an illegal weapon, watch a video, program a software, etc. by interacting with information that is dropped off personally, refreshed continuously, and displayed under the multiple vests of texts, images, sounds, and call to action. Things goes very differently with the page, which cannot host diverse, mobile windows, does not communicate through notifications, and can contain (preferably and more easily) only texts or (less frequently and with more technical difficulties and limits) static images.

For these reasons, it is true that – on the one hand – understanding screens exclusively from the perspective of images is quite narrowing, insofar as our standard, inherited conception of the image is *visually* informed: it reduces the experience of screens – which is largely made of touching – to what they enable *to see* seems to betray an imagocentric stance (Carbone & Lingua 2023). Nevertheless, on the other hand, one fundamental anthropological implication of the shift from the page to the screen – especially for the aim of the present contribution – is that visual languages have started to become less and less the domain of specialists, mainly from fine arts, and more and more daily mediators of communication, expression, and thinking, i.e., a true *culture-building* factor. We view, capture, save, create, modify, share, etc. an increasing number of video-images of all kinds as a part of our everyday routines: they have become central in every activity that connects humans to each other and reference points for information and knowledge (Burnett 2005). This is forcing us to acknowledge not only how we are accustomed to think by using «a panoply of non-sentential representations throughout our ordinary lives» (Camp 2007, 145), but also how without images we would never have representative and reflective thinking, that is, the very notion of a difference-in-the-relation between mind and world, idea and thing, internal and external, false and true (Malafouris 2007; see also Jonas 1962).

So, although the emergence of a pictorial or iconic turn may be considered even a cyclical trope in human history (Grønstad & Vågnes 2006), an epoch-making revolution is at stake today: the traditional «world-as-a-text» model, for which everything in the world exists in order to end in a book, has started to be challenged by the «world-as-a-picture» model, for which instead everything in the world exists in order to end in a video-gallery (Mirzoeff 1998; see already Sontag 1973). In this respect, the exposition to screens is the epitome of a tendency dating back at least to the first half of the 20th century, when media such as photography, cinema and television began to compete with – or, as someone fears, replace – the typographical medium in framing minds, gradually eroding the monopoly of the written word (Antinucci 2011). This is absolutely crucial, since it implies a direct challenge to the general skepticism – if not true hostility – about images and their cognitive reliability that characterizes our cultural and philosophical tradition from its very beginning. Indeed, at least starting from Plato, «a long history of suspicion attends to the role of the visual in western thought», so that even today we can experience «the longstanding distrust of visual methods as primary modes of epistemological work» (Drucker 2020, 10-11). On the contrary, especially with the mechanical reproduction of the words inaugurated by «the printing revolution» (Eisenstein 2005), written word became the general, exclusive model for all processes of communication and understanding, as we can now realize critically (e.g., Harris 2009; Kress 2000). For example, Ellul (1981, especially 172-201) – however prone to use apocalyptic tones – denounced that the direct proportionality between the triumphal progress of images and the regression of the word forced the latter into to a true humiliation, leading to the devaluation of an entire culture founded on articulate, deep and reflective reasoning.

This is symptomatic of a tendency to establish a separation between the two domains and registers of word and image, which are not only taken as opposing symbolic systems, but also put into a severe hierarchy: word, «marked by linear and classificatory rationality», predominates on image, «characterized by associative and fusional immediacy» (Carbone & Lingua 2023, 74). Words are devoted to bringing knowledge and thinking and images at best to exciting and entertaining: consequently, reflective thought is in danger when mind is exposed to fluxes of images, since they impose themselves as immediate, unquestionable givenness that does not demand a critical attitude, but rather mesmerizes, attracts, and hypnotizes. Images engender passive submission rather than attentive interlocution, by putting chaos, entertainment and depravation (*eternal childhood*) in place of order, reasoning and rectitude (*adulthood*): this was – for example – the “bookish” welcome given to

mass visual media such as cinema (Huizinga 1936, 75-76), comics (Wertham 1954) or television (Postman 1985; Sartori 1998). With these premises, philosophizing through images is simply impossible, as even who was highly sensitive to the expressive affordances of images claimed firmly: since «images are always concrete, never abstract», cinema (but the same goes with any image-medium whatsoever) is «an artistic and not a philosophic language»; it may be «a parable, but never a directly conceptual expression» (Pasolini 2005, 171). Ultimately, «pictures are for entertainment – if I wanted to make a philosophical point, I'd publish an essay in *Proceedings of the Aristotelian Society*» (Smith 2006, 39).

Against this background, my contribution explores another possibility, taking seriously the anthropological consequences of the spread of screens, which – like it or not – promises to change our very habits of thought. I will argue that our increasingly visual mediascape opens up the possibility to imagine other ways of doing philosophy, following those media theorists who have begun to draw our attention to the peculiar media oblivion that has led philosophers not to put into question the expressive and technical media supporting their own everyday practices (e.g., Hartmann 2000; Kittler 2009). In particular, I will outline the possible contours of a new image of thought for which even philosophizing can take place through the medium of image at least as much as through the medium of word, by particularly focusing on the medium of comics, whose very structure avoids the opposition between the expressive resources of words and images. With this aim, Section 2 discusses the limits of the idea that screens are unavoidably destined to have a negative and even lethal impact on a series of abilities and attitudes that are strictly associated to philosophical thinking. Then, Section 3 engages with the case of philosophical comics from both a “transcendental” and an “empirical” perspective, by at the same time focusing on the condition of possibility of philosophical comics (Section 3.1) and using as an example *How to Do Concepts with Images: A Graphic Essay* (Pezzano et al. 2024) (Section 3.2). It is an experimental, philosophical comic that I have co-developed with the International School of Comics of Turin, Italy, as a part of two research projects on how the ongoing change in knowledge production and distribution may also affect philosophical practice. Finally, Section 4 concludes by making a plea for a more liberal and inclusive philosophical practice based on the decoupling of “concept” and “verbal concept”.

2. More than Meets the Eye? Philosophy in a New Epistemic Environment

At first glance, the current mediascape is anything but a good soil for the cultivation of philosophy. Indeed, the digital, screen-based mind would be one educated to reactivity rather than cognition, to excitement rather than reflection; we would be arrived at an important juncture in our intellectual and cultural history: the transition from the linear, focused and rational mind to the shallow or “grasshopper” mind. While the medium of the print advantaged slower and time-consuming, deep processes that include deductive and inductive inference, critical analysis, reflection, perspective taking, abstraction, evaluation, and the like, i.e., the supposed true reasoning, screen media advantages fast processing of multiple bits of information, that is, continuous monitoring, dart-quick task switching, fragmentary skimming, compulsory skimming, impatient skipping, superficial browsing, and so on (e.g., Carr 2020; Jackson 2008; Weigel & Gardner 2009; Wolf 2007). The so-called “multitasking” would actually be an incessant *task switching*, since our cognition is limited in its ability to pay attention: our ancient brains would not be made for this high-tech world constantly full of interferences and solicitations; we would inherently be information-seeking creatures who forage for information resources in a manner similar to how our ancient ancestors foraged for food and defended themselves from the dangers of life in the wild (Gazzaley & Rosen 2016; for a review of the criticisms of such an a-dialectical stance, see

Gannon 2002). Too much noise and confusion outside the mind produces noise and confusion inside it: we would have inexorably entered the post-alphabetic phase of «the Great Fusion» (Simone 2000), based on immediacy, destructuration, genericity, vagueness, and undifferentiation, resulting in non-hierarchical and non-syntactical meanings. Finally, the condition of «secondary orality» (Ong 1982, 133), which has now already become of secondary *multisensorial co-presence* (from Zoom calls to metaverse environments), is exposing humanity to the threat of re-tribalization.

As someone condemns with very alarmist and contemptuous tones (e.g., Han 2023; Spitzer 2012; Türcke 2012), such a perpetual exposition to visual stimuli and information delivered in real time is eroding every room for contemplative life, there where the theoretical attitude grows up: a tribal mind is intrinsically uncritical. This would mean that our fast, time-consuming interaction with screens tends to dissolve the very preconditions for those *slow thinking* activities such as challenging preconceptions, showing groundlessness, demonstrating fallaciousness, arguing by giving reasons, and the like: not by chance, the parallel with fast food is commonly used to describe the digital condition of «infobesity». With these premises, deep thought, higher-order cognition and our very attentional faculty are something that has to be *protected* from screens, rather than being *exposable* through them, and the best possible “firewall” against digital colonialism is the page (Casati 2013). After all, the page would emerge as an alternative to scrollable, extendable screen-alike surfaces even originally, when – between the 4th and the 5th century – the *volumen*, a scroll of papyrus or parchment to be manually unrolled from left to right or from up to down, was replaced by the *codex*, substituting a homogeneous and continuous space filled with a series of juxtaposed written columns with a discontinuous series of clearly delimited unities (Agamben 2017, 100-102). Thus, the old-school book would possess some distinctive cognitive advantages to be preserved: the linearity and unity of its contents simplifies the comprehension; the stable, confined space of its pages allows one to keep an eye on many thoughts at a time without being tempted by *doomscrolling*; its intrinsic *offline status* offers a relative isolation from the intrusion of external sources of information. Further, the dense word-lines of the page provide the opportunity to see very little, freeing us to see *in our mind* (Mendelsund 2014), a feature that becomes healing when humanity – even before the coming of YouTube, Instagram, TikTok, etc. – is «increasingly inundated by a flood of prefabricated images» that risks making us lose «the basic human faculty» of «bringing visions into focus with our eyes shut», precisely in the sense of «bringing forth forms and colors from the lines of black letters on a white page» (Calvino 1988, 91-92).

Definitely, preserving this ability to see with the mind’s eyes seems even more urgent when philosophy sets in. Attentive reading, reasoning, analyzing, understanding, inferring, classifying, arguing, reflecting, problematizing, abstracting, and so on and so forth: all that is the daily bread of the philosophical work, which is precisely based on the processing of *texts*. Indeed, it is the word that offers those general, decontextualized and disembodied meanings which lie at the very heart of philosophical practice, at their best represented by highly disincarnate ideas such as “being”, “absence”, “truth”, “freedom”, “meaning”, “categorical”, and so on. It is the realm of the invisible, of the pure intelligible: something that has to be understood by being conceptualized through words, not to be seen through external images. From this perspective, the mediascape may even be increasingly visually based, but philosophy can only be supported by the medium of word-writing: to fight a situation that is «subverting the capacities for individuals and societies to create the conditions for philosophy», we would never forget that to create philosophers «it is to writing and print that we must continually turn» (McLaren 2012, 388, 410). Such a *media conservatism* may appear as a mere snobbish attitude, but at a closer look it may better reveal a true transcendental limit. Indeed, the media conditions of possibility of philosophy appear as actually indissociable from the word, since *only* writing can facilitate reasoning and

enable abstract and theoretical thinking, as it has been variously claimed in anthropology (Goody 1977; 1986), media studies (Havelock 1986; Olson 1994; 2017; Ong 1982), media philosophy (Stetter 1999), philosophy of mind (Menary 2007), philosophical anthropology (Sloterdijk 2012, 53-56), and genealogical inquiry (Sini 2016).

Hence, the peculiar «consistency» of philosophy would derive from the fact that «it is written»; in this way, ideas are recorded «in principle forever», becoming ruminable «over and over again» for present as well as future thinkers, which opens up the opportunity to move us «away from questions that are concrete and particular» towards «the generality and abstractness» of the arguments. Saying that writing is «a sufficient condition for formal philosophy» is too much, but it «certainly seems to be necessary» (Appiah 2003, 339-353). However, the very meaning of writing is changing even drastically today, going in the direction of a syncretic or extended practice that integrates words and images in various ways (Montani 2020) and breaking the exclusive link between thinking and words (Flusser 1997, 41-60). Thus, it is at least legitimate to ask if the historical fact that philosophy had the alphabet as its privileged evolutive partner *eo ipso* implies that its source coincides with its only possible end in a both teleological and chronological sense. What was originally illegitimate, is it meant to be such forever? Does the *de facto* determine the *de jure*? And what if the *de facto* changes? Does it become possible to write philosophy differently? The problem is huge: if we keep firm that philosophical thinking can have no other evolutive partner in the future, then the contingency of the empirical or historical-transcendental condition of philosophy (whose existence is already no small concession for many) determines an eternal, univocal situation, and philosophy has to be screened from screens, always returning to the shelter of a page filled with words.

The limit with such an outcome is that it risks seriously excluding philosophy from the novel cognitive ecology that internet is cultivating, a transformation of our very epistemic environment that would be extremely shortsighted to take as uniquely detrimental and alien to the human mind (Clowes 2019a; 2019b). After all, even those who are worried about the current change of our cognitive landscape envisage as a solution the development of a «biliterate brain» that is not split between the page and the screen but is rather steeped in the best of both (Wolf 2018, 125-138). So, the key question is if this can also apply to philosophy: is it possible to develop something like a biliterate philosophical brain, here in the sense of a mind that is able to think philosophically through images as well as through words? When the production and distribution of knowledge are increasingly a matter of visualization, we can and probably should ask if a renewal of philosophy is possible and even what kind of improvements we could expect (or, at least, hope to obtain) from it.

This is where comics can come in, being particularly prone to support forms of «biliterate» writing/reading able to combine the virtues of the old-school, deep reading and those of the new-school reading (Calabrese et al. 2021).

3. Comicepts: Philosophizing through Comics

3.1. Comics as a Medium: On the Conditions of a Graphic Philosophy

Indeed, comics blend image and word «to create a unified, albeit complex, whole» (Meskin 2009, 235) in which images are not treated as mere illustrations, but as a true co-worker in the process of sense-making. In comics, word and image intermingle, interanimate, resonate, and interweave, providing a «double orientation» (Sousanis 2015, 64) that gives them «equal ontological priority» (Wartenberg 2012). The verbal and the visual collaborate in generating meaning, or – more precisely – they co-explore all the range of interactions from convergence to divergence (McCloud 1994, 138-161). Thus, comics marries

the apparently opposite virtues of words (linear, discursive, discrete, etc.) and those of images (simultaneous, iconic, holistic, etc.) in such a way that it factually disproves the belief that images and visuality are as such immediate and universal, not requiring any learning process or cultural convention to operate meaningfully (Cohn 2013). Furthermore, this wedding is such that a true mash-up between them takes place: on the one hand, images are treated as words, namely, they are used as a way of saying things, exposing ideas, suggesting points, and so on; on the other, words are treated as images, insofar as the style of presentation of the text (font, dimension, colour, placement, etc. the so-called “lettering”) contributes to the work’s meaning (Hudson Hick 2012). Ultimately, this has as a consequence also the full exposition of a condition that is as trivial as overlooked in traditional texts: even letters are graphic signs occupying a space, so that word-writing is however an exercise in graphic design (Holbo 2012). However, in comics such a process leaves the background and becomes an explicit performance, giving birth to a «spatio-topical system» revolving around the design of the page intended as a «hyperframe» hosting panels, layers, threads, balloons, gutters, frames, etc. whose composition is not just guided by aesthetic taste, but is an essential factor in sense-making and meaning-communication (Groensteen 1999).

So, «what would it mean to do philosophy, to theorize in comics, not just about them?» (Mitchell 2014, 263). At first glance, comics appear as highly refractory to supporting philosophical reflection: not only are they contaminated by images, but these images are often associated with childishness, simplification, frivolity, superficiality, fantasy, and so on. From this perspective, if a comic is ever philosophical, it would be so only *in spite of* its images and never *thanks to* them. In other words, it would be philosophical merely occasionally and extrinsically – at best, it might bring abstract problems to life in a stimulating and accessible way (McLaughlin 2005; 2017), which would amount to no more than an entertaining and popularizing function. So, if comics are to be philosophical in an intentional and intrinsic way – by truly presenting, understanding, and answering philosophical questions (Cowling & Cray 2022, 11) – they must be capable of making arguments by wedding word and images into a unique mode of philosophical “writing + drawing”: this would constitute a true «graphic philosophy» (Wartenberg 2023, 238-289). Drawing on the notions of «means conditions» (Livingston 2006), «Best Tool Principle» (McClelland 2019), and «formal means» (Nilsson 2024) that have emerged in debates on “film as philosophy”, we can argue that at least two conditions must be satisfied to achieve such a «graphic philosophy».

First, the traditional philosophical text should not be taken as a model for the format of a philosophical comic: a paper and a graphic essay should perform different tasks and be differently suited to diverse context and aim – arguably not in the sense that the latter gets involved merely for educational purposes, as a kind of philosophy “for young people” or “for dummies”. *Second*, comics should be genuinely regarded as a medium – that is, a means capable of expressing and addressing anything, also within the philosophical domain. Not only should the graphic discourse of comics be able to engage with concepts as well as with stories, facts, and so on – just like the traditional text – but a philosophical comic should not focus solely on comics themselves (as was paradigmatically the case with McCloud 1994; see also the pioneering Sousanis 2015). After all, a philosophical paper is not typically a reflection on writing in general, much less on academic writing specifically.

In this respect, there are at least four elements that may pave the way for having true “comicepts”,¹ that is, concepts created and communicated by leveraging the specific features of comics as a medium. *First*, the intrinsic multimodality of comics – that someone

¹ I owe the expression to Nilsson (2024), who adopts the term «cinecepts» to refer to philosophical concepts created through audio-visual means. I have also adopted it in the study of possible «gamecepts», that is, philosophical concepts created through videogame means, in Pezzano (forthcoming).

even reads in terms of multisensoriality (Hague 2014) – appears as particularly well-suited for meta-discursive exploration, at least more than any monomodal form that can develop on just one level, thus being unable to go beyond a diminished meta-referentiality (Cook 2017). This can support the generation of “objectifying”, “reflective” or “distancing” effects that are a crucial part of any critical, argumentative, analytic, etc. thinking. *Second*, comics occupy a kind of intermediate position between the book and the hypertext, which gives them a kind of “tree-like + rhizomatic” dual nature. Comic discourse still takes place on the confined, ordered space of the page, i.e., within a fixed, static environment able to support reflection and inferential reasoning, where the philosophical discourse finds its own comfort zone. At the same time, a comic page is not exclusively hierarchized and horizontal, but also allows us to navigate and participate in the sense-making, as well as to experiment with the various layouts displayable on screens in a more flexible way (Calabrese & Zagaglia 2017; Sousanis 2015, 58-63; Eisner 1990, 147-161). *Third*, comics do not require advocating for an anti-propositional stance opposing word and image. This is crucial not to oppose the traditional, verbal practice of philosophy to a hypothetical, visual one, as if the latter would be supposed to get rid of those alphabetical resources which have nurtured the former. *Fourth*, the cartoonist character proper of comic images (which does not mean that all comic images are as such cartoons, obviously) implies a peculiar kind of abstraction: an «amplification through simplification», according to which details are not eliminated but selected, in such a way to both focus attention towards a certain idea and stimulate an active filling up, resulting in conceptualized images (McCloud 1994, 30-37).

Calvino once wrote that the «wrangle» between philosophy and literature is such that while the eyes of philosophers «see through the opaqueness of the world, eliminate the flesh of it, reduce the variety of existing things to a spider’s web of relationships between general ideas», that is, to an impersonal chessboard with abstract chessmen, the writers come and replace them «with kings and queens, knights and castles, all with a name, a particular shape, and a series of attributes royal, equine, or ecclesiastical», rolling out «great dusty battlefields or stormy seas» (Calvino 1997, 39-40). So, while literature is closer to concreteness and particularity, philosophy is more tempted to fly towards the higher sky of abstractness and generality. However, this is also part of philosophy’s virtues, since it is not at its best when it is «too fully clothed in human flesh, too sensitive to immediate, lived experience» (Calvino 1997, 41). On these bases, literature may offer a kind of corrective to the «phantom lightness of ideas», by reconciling it with the «heavy weight of the world» (Calvino 1997, 49). For Calvino, literature turns type into tokens, in order to bring concepts to life: it is not the king in general or even The King “as such”, but *this* king, in *this* situation, etc. Yet, such an operation of instantiation betrays an unescapable, ekphrastic nature in literature: literary images *are made of words*, as the same Italian writer acknowledges, by stressing that in this «clash» each side is «perfectly well aware that the raw material of its own constructions is the same as that of the opposition: words» (Calvino 1997, 40).

But things change with comics, which can also use the different raw material of images, and not just to provide a “storytelling” corrective, viz., a way of producing a kind of philosophical *Biblia pauperum* for educational purposes, or an “existential” rebalancing, viz., a way of (re)connecting the austere, philosophical discourse to the living, everyday experience. Rather, a true contribution to the very process of conceptual elaboration can be at stake, and one that is not – for example – limited to the terrain of ethics, which is more likely called in also when the possible encounters between literature and philosophy are considered (e.g., Diamond 1993; Gaita 2004, 55-60; Nussbaum 1990). Indeed, even without concluding that philosophical discourse is grounded in «absolute metaphors» that are not translatable back into conceptual language (Blumenberg 2010), it has to be remarked how philosophers have always had recourse to plenty of (*verbal*) pictures in their theoretical works in a very inventive and surprising way, in spite of their pronounced prejudice against

the concreteness and immediacy of images (see, e.g., Falzon 2002, 3-5; Mitchell 1986, 5-6, 158). Such images play a role that is not just illustrative, but rather expositive and even argumentative: they are used as a way to illuminate ideas, as pathways to the understanding of philosophical thinking, and even as tools for structuring thought itself – namely, they are a key element of the very design of concepts.

In this respect, comics could guarantee a “boost” to such a practice, precisely for their ability to make a truly visual image out of a merely verbal image, opening the possibility to develop a theoretical, metaphysical, ontological, and so on *graphic* discourse. If «philosophers have a great taste for images», to the point that «there is no trade that requires more of them», but at the same time they «hide them under dull-gray words» (Valéry 1976, 68), then we can dress such images up in a truly visual fashion through comics, exploring new ways of making points, presenting ideas, and defending arguments, all without abandoning the “safe zone” guaranteed by the page.

3.2. How to Do Concepts with Images: An Example of Graphic Philosophy

In this vein, *How to Do Concepts with Images* (Pezzano et al. 2024) – the result of nearly two years of collaborative work, particularly with the scripter and letterer Manfredi Toraldo and the artist Lorenzo Livrieri – presents a multi-layered structure comprising eleven comic sections: five narrative sections [NS], five conceptual sections [CS], and one final hybrid section [HS]. Narrative and conceptual sections proceed in parallel but remain independent. Thus, one can not only read the comics in the main order, but it is also possible to begin by reading all the narrative sections and then all the conceptual ones – or vice versa. Alternatively – and hypothetically – one might choose to read only the narrative sections or only the conceptual ones. In addition, the comic sections are followed by a verbal afterword and a detailed, commented bibliography, for a total of 169 pages. Therefore, the structure and contents of the work can be summarized as follows:

- NS1: *Imago* (12 pages).
 - CS1: *Mental Habits* (25 pages). Explores the plural nature of modes of thought from a perspective that spans philosophy of mind and historical-theoretical media studies.
- NS2: *Arthur* (7 pages).
 - CS2: *Comics as a Medium* (12 pages). Defends the full-fledged status of comics as a medium, with a primary focus on comics studies.
- NS3: *Simone* (7 pages).
 - CS3: *“Word VS Image” or “Word & Image”?* (17 pages). Challenges the canonical opposition between word and image in light of investigations in visual culture studies, visual thinking studies, developments in media theory, and research on the problem of epistemic injustice.
- NS4: *Anteros, Harmonia, and Jorge* (9 pages).
 - CS4: *Encounters and Clashes of Medial Civilizations* (31 pages). Offers a historical-conceptual framework for understanding the “media panic” that accompanies the transformative shifts in cultural transmission, from the alphabet to the web.
- NS5: *X* (5 pages).
 - CS5: *Towards a Post-Literate Rationality?* (13 pages). Addresses the “myth of the written word”, outlining the possible contours of a post-alphabetic rationality.

- HS: *Credits* (5 pages). Concludes with brief reflections on the nature and future of philosophy from a metaphilosophical standpoint.
- *Afterword* (7 pages). Retrospectively introduces the genesis and purpose of the comics.
- *Bibliography* (19 pages). Provides and explains the references for each of the expository sections of the work.

Such a multimedia, stratified context enabled us to accomplish thing that would not be possible in a traditional text. I will highlight just three examples (see the figures in the appendix). First, the spatial structure of the book as a medium – both graphic and mental – is thematized by being displayed in a way that makes it visible as if from the outside, resulting in a more refined meta-discourse than the typical one in which the author would merely have spoken about the book (Figs. 1-3, from NS4). Second, the problematization of the adamant belief that images inevitably contaminate thought is both shown and through the staging an interaction between two young, irreverent streamers and an old, moaning professor, offering a semi-fictional and meta-medial presentation of the challenging encounter between “new digital minds” and “traditional bookish minds” (Figs. 4-8, from NS4). Third, the idea that the abstracting mind would have taken shape by interiorizing the written word is co-discussed both verbally and visually, forming “dual” logical sequences that rely on the symbiotic integration of words and images (Figs. 9-13, from CS4). All of this can happen without abandoning written words, renouncing linearity, exiting the academic practice of quoting, or giving up the ability to pause, move backward or forward, and allow readers to stop, analyze, reflect, re-read, meditate, and deepen their understanding. In short, there is no need to invoke – as is the case with some perspectives inspired by design – a «non-discursive approach to philosophy» (Hummels et al. 2022) or a «philosophy without texts» promoting a non-verbal investigation of “show, don’t tell” (Rietveld 2022; see also Mol 2022; Rietveld & Kiverstein 2022).

Patently, making also visible what was once just sayable cannot come without having effects on philosophical practice itself, which is dragged into a process of true alteration. Yet, precisely the demand of designing complex and coherent “visual + verbal” discourses made by comics can pave the way for learning and discovering something new about philosophy itself. For example, we could find how attributing a character to an author, as well as to potential readers, can contribute to the effective development of the discourse, marking a difference with the currently predominant format of philosophical research, viz., the paper, which prescribes a pure impersonality in the sense that it has to be designed by and for “angelic” consciousnesses whose personal traits should be thinned to nothingness (see Danto 1986, 135-161). In *How to Do Concepts with Images*, the leading essayist (Ena) is not anonymous or external to the discourse but instead suggests a specific gender, age, neuropsychological condition, tone, etc. and overall attitude. This characterization not only makes the epistemic standpoint of the work more explicit but also contributes to its articulation (Fig. 14).

Especially in the analytic tradition, the prevailing canon of academic research calls for an entirely disembodied philosophizing. However, the idea that «if a thinking situates itself, embodies itself, or historicizes itself, then it is not profound, and worse, not philosophy» reflects «a rigid and dogmatic sense of what philosophy “is” and what it is not» (Sanchez 2011, 40). Are we certain that this should be taken as an indisputable given rather than something to be reconsidered and amended? Once again, the time is ripe to ask whether such a firm belief is also induced by the media conditions that have shaped philosophical practice throughout its history. Is it truly desirable – and even before that, possible – for such a practice to remain unchanged in the face of a new, increasingly visual mediascape?

4. Conclusions: A Plea for Media Pluralism

In this paper, I discussed the idea that our familiarity with screen-based devices opens up the possibility of imagining new ways of doing philosophy that take place through the medium of image at least as much as through the medium of word. Section 1 introduced the general question of the change in habits associated with the transition from page/word to screen/image, challenging the traditional skepticism regarding the cognitive reliability of images. Section 2 highlighted that considering screens as uniquely destined to have a lethal impact on philosophical thinking risks excluding philosophy from the novel cognitive ecology cultivated by the internet. Section 3 examined the conditions of possibility of true «comicepts» – concepts created and communicated by leveraging the specific features of comics as a medium. In doing so, I used as an example *How to Do Concepts with Images*, a philosophical comic that I have co-designed with the International School of Comics of Turin, Italy (Pezzano et al. 2024). This reference was not intended to serve as a model or paradigm for philosophizing through comics – not least because its unavoidably experimental and pioneering nature makes the design choices structurally revisable, disputable, and improvable.

Ultimately, I defended the idea that philosophy may have recourse to comics not in order to enliven its discourse, that is, to make it more entertaining and the like, but as a way of testing and discovering new methods for philosophizing in an increasingly visual age. As I have stressed, one of the advantages of comics is that they lend themselves to trying to do concepts with images by preserving some of the traditional virtues of the wordy page at the same time. Indeed, the fact that we are witnessing the end of a monopoly does not mean that the monopolist – in this case, the written word – is next to disappear, being supplanted by another one: there is no advantage in reiterating the same reductive attitude which one was trying to question, as if the day of substituting an old-fashioned medium with an updated one is next to come. Being truly liberal does not mean to exchange one absolutism with another, but rather to reject the very absolutistic and monopolistic logic, admitting that it is precisely through confrontation and even competition, i.e., through relations, that different capabilities can be better shaped up and specific niches can be distinguished. In other words, imagining philosophizing through comics does not engage in usurping the function of the book or bidding farewell to the text, thereby making comics the ultimate philosophical medium. If on the one hand, we can say that “whereof one cannot (solely) write, thereof one can (also) draw”, on the other we should also remark that “whereof one cannot (solely) draw, thereof one can (also) write”, since it is a matter not of contraposition but of collaboration: definitely, comicepts, if they have a chance to truly exist, are not supposed to replace traditional verbal concepts.

Thus, the challenge is starting to explore the specific way in which we can do philosophy through comics, discovering new possibilities as well as downgrading some of the old ones. For the comic medium is just like the other media: on the one hand, it is suitable for doing much more things than we tend to assume, exploring the most frivolous genres as well as the deepest ones; on the other, it constrains our opportunities, in the double sense that it discloses some possibilities and conceals others, since unveiling and veiling, incomes and losses, go always hand in hand in a medium. However, it does not suffice to say that what has to be done is embarking on the exploration of such a territory in the first person, be it for no other reason than an entire social practice and shared culture is required as a background. The spread of new communicational forms of open dialogue between peers, in which research consists, cannot be merely delegated to personal goodwill: it primarily depends on the existence of a given sociocultural humus. Therefore, the lack of comic “graphic essays” with a specific philosophical purpose as an autonomous genre is not merely attributable to individual old-school philosophers reluctant to engage with their intentional

design routinely, nor can it simply be attributed to a conspiracy by the supposed spectre of the “priests of the word”. Rather, there are numerous practical motivations, ranging from economic and technical factors to educational and institutional ones. After all, on the one hand, a pen and some sheets of paper are inexpensive and do not pose the problem of mechanical obsolescence. On the other, we are trained to write with words from the earliest stages of schooling, the parameters for blind peer review of papers are well-established, and there are no proper infrastructures for producing and disseminating philosophy in alternative formats. In short, the entire academic system of incentives is currently heavily text-centric – if not even more narrowly paper-centric (Pezzano & Gualeni 2024).

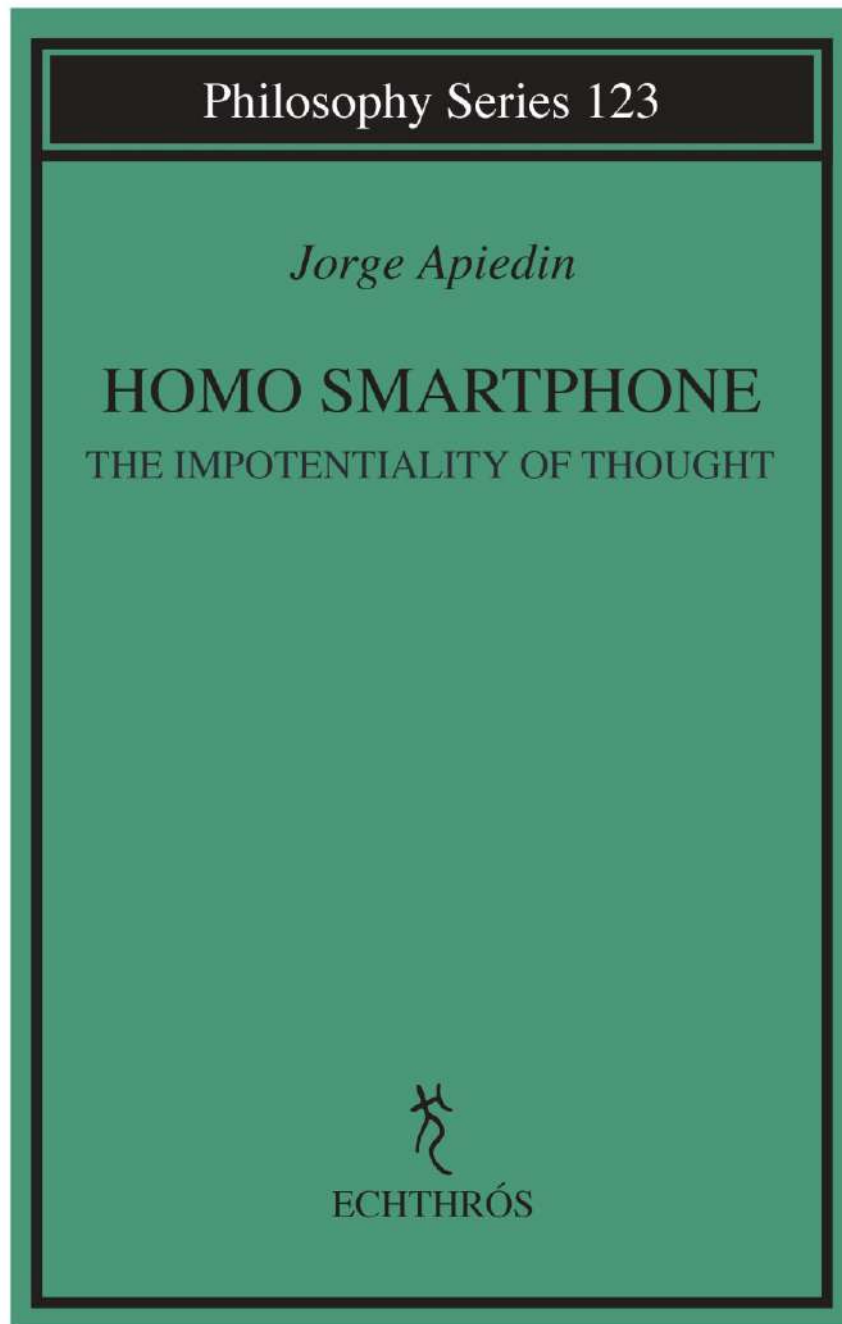
Nevertheless, all that should not become a reason for rejecting any kind of change *a priori*. If philosophical knowledge can be seen as the activity of designing those particular semantic artifacts named concepts (Floridi 2019, 27-52), then today we can at least consider the possibility that such a design may also be done by means other than written words – returning a little bit of the graphical soul to such designing. In this way, we can leverage the «digital’s cleaving power» of “cutting-and-pasting” features of the world and our corresponding assumptions about them (Floridi 2017) in order to finally decouple “concept” and “verbal concept”. Maybe philosophers have hitherto only *written* the world, and the point is now to (also) *visualize* it – Is this too comic an idea?

Acknowledgments

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Figures

A) *Figs. 1-3* [drafts from NS4]. A (meta)display of a (semi-fictional) traditional book, presented both as a material device and as a *forma mentis*.



was printing these pages, a news story reached me that is as tragic as it is revealing of the dark times we are heading – if not even running wild – towards. A boy died in a hit-and-run accident because he was living trapped in the mental cobweb of images that the screen had woven around his attentional faculty, while a poster girl, nowadays they call them “streamers” or “content creators”, committed suicide as she was living similarly trapped in a pseudo-reality created by fiction, where rest and stopping to think, reflect, and critique has become impossible. All of this only proves my argument in this book, providing yet another tragic example of how the gestures and behaviors of individuals have been reshaped from top to toe by the cellular telephone (which the Italians dub the *telefonino*). Such a total decay of customs led me to develop – I must confess – an implacable hatred for this apparatus, which has made the relationship between people all the more abstract. I found myself more than once wondering how to destroy or deactivate those *telefonini*, as well as how to eliminate or at least to punish and imprison those who do not stop using them. I’m afraid that Adorno was on the mark when he wrote, in the § 92 of his *Reflections from Damaged Life*, that

The objective tendency of the Enlightenment, to wipe out the power of images over man, is not matched by any subjective progress on the part of enlightened thinking towards freedom from images. While the assault on images irresistibly demolishes, after metaphysical Ideas, those concepts once understood as rational and genuinely attained by thought, the thinking unleashed by the Enlightenment and immunized against thinking is now becoming a second figurativeness, though without images or spontaneity.

Amid the network of now wholly abstract relations of people to each other and to things, the power of abstraction is vanishing. The estrangement of schemata [...] ceaselessly enforces an archaic retranslation into sensuous signs. [...] Representation triumphs over what is represented. Their outsize, simplistic and therefore false comprehensibility corroborates the incomprehensibility of the intellectual processes themselves, from which their falseness – their blind, unthinking subsumption – is inseparable. [...] What was once called intellect is superseded by illustrations. It is not only that people are no longer able to imagine what is not shown and drilled into them in abbreviated form. [...] What is acted out by such pictures and then re-enacted by the well-versed onlooker, in the instantaneous sizing-up of the situation, the unresisting submission to the empty predominance of things, is the jettisoning of all meaning like ballast.

Possibly the ultimate sign of this desperate situation is the existence of wannabe pseudo-thinkers who, instead of shielding the concept from screens, end up poisoning it with images to the point where they titrate their pseudo-texts with strange, incomprehensible terms such as *DIgit4l-m3nte*. Since when did we start supinely accepting that future generations would no longer think? *Mala tempora currunt*, for thinking and for humanity as a whole: only a book can save us now.

Paris, 15 March 2024

B) Fig. 4-8 [drafts from NS4]. A sequence presenting a (semi-fictional) dialogue between “new digital minds” and “traditional bookish minds” during a live stream.



SCREECH LIVE

MARTE LIVE (tutti i Martedì)
due chiacchiere con il professor APIEDIN

CHAT

hahaha, Memez messed up!
Gormita99:
how can you mess up with BugaCrime??
MODERATORE:
don't start with BugaCrime or I'll kick you out. @proposito the t-shirts will be given away later.
GUGIA:
why is there always a toxic male?
PORTAMADOSCA:
he's alive!!!! What is he, a Luddite!
DylinDolon:
I find it unfortunate...
Gormita99:
but it's not our fault, BugaCrime is so d4mn h0t!
MODERATORE BANNED Gormita99

SCREECH LIVE

CHAT

Contosudi3:
what are Luddites?
Skeletor75:
uh, who is today's guest?
GiorgioNapoleitano:
I like them better when they talk about anime...
RitmoLamantino:
Luddism was a movement that sought to destroy the machines...
GUGIA:
a philosophy professor
DylinDolon:
they want to have a torchlight procession
PORTAMADOSCA:
a guy who doesn't even know how to use a cam

SCREECH LIVE

CHAT

GiorgioNapoleitano:
a torchlight procession? The two Martians?
RitmoLamantino:
however this guy here is a bore...
giococcolosa: even my philosophy prof had trouble with the computer
GUGIA:
but really? what a bore... I thought philosophers made people argue...
DylinDolon:
nah, the torchlight procession to rthe chick's death.
DylinDolon:
she also had a sick grandmother
GUGIA:
I know there's a fundraiser for the grandma

SCREECH LIVE

NOTHING BEATS
READING AND COM-
MENTING ON TEXTS...

TO DWELL
PROPERLY ON
CONCEPTS...

THAT IS, TO DISENTANGLE THE
MEDIATING CHARACTER OF
WHAT APPEARS IMMEDIATE!

CHAT

PedroPasqual:
see, @Pierco?

Pierco:
oh you people will believe anything!

Picard>Kirk:
I took philosophy with a guy who made
us read comic books...in high school

PORTAMADOSCA:
bah, ask him a few hard questions...

BiOParc0:
Martians, ask him how he would print
his books without technology (luddi-
tes=dumb)

GommaColCappello:
Long live Two Pieces!

Giulia:
he's right, though, reading is important
[this fundraiser](#)
you can check out the fundraiser at

SCREECH LIVE

BUT ALSO IMAGES
SERVE THE PURPOSE OF
UNDERSTANDING...

THE SLOOOOOW
EFFORT OF THE
CONCEPT REQUIRES
READING CAREFULLY!

STAY AWAY FROM
THE DISTRACTION
OF IMAGES!

CHAT

[www.frimagosgran.help](#)
[frimagosgran.help](#)

sorry I meant: [forimagosgran](#)
[forimagosgran](#)

still dot help

RitmoLamantino:
but read other stuff too, nut just books!

Picard>Kirk:
my prof used to say that comic books
are also important...

Picard>Kirk:
he made us read MAUS and WATCHMEN
and some other one...

[forimagosgran](#)
anyway, it's a crowdfunding...

GommaColCappello:
I saw the movie!

GommaColCappello:
the blue guy rocks! like Truffy!

SCREECH LIVE

AS LONG AS
THEY ARE
WORKS OF
ART, IT IS
STILL OKAY.

HOWEVER,
IT IS ONLY ON
THE PAGE THAT
WE CAN TRULY
EXPRESS OUR-
SELVES AND
THINK!

CHAT

PedroPasqual:
they should make a movie about the pro-
fessor's book! so that his brain explodes!

PORTAMADOSCA:
das he really not use slides?

OrcoHorcru:
have they given away the t-shirts yet?

Giulia:
I studied economics, I used to memorize
everything for the exams

propositivo06:
not yet no t-shirts for now

RitmoLamantino:
prof Burbero says that studying by
memory is useless, he's the one who
says this guy's an idiot

OrcoHorcru:
thanks

PORTAMADOSCA:

SCREECH WELL, SORRY, BUT RIGHT NOW WE ARE APPEARING ON THOUSANDS OF SCREENS...

BAH, I JUST WANT TO TALK ABOUT MY NEW BOOK...

YEAH, HOMO SMARTPHONE -- THE IMPOTENCE OF THOUGHT...

SOUNDS CHALLENGING.

IT MUST BE, I DO PHILOSOPHY, NOT COMICS OR VIDEOS!

IS IT TRUE THAT YOU ALSO TALK ABOUT IMA-GO'S SUICIDE?

CHAT

LONG LIVE BURBERO!!!

GIGIA: heh, but sometimes there is no alternative

PORTAMADOSCA: I KNEW IT!!! he's a sellout!!!

GIGIA: when you have to study three books for a month either you memorize them or they will flunk you

ForCaCaudina: what do you mean by sellout?

GIGIA: or make nice with the teacher... it happened in my class...

PORTAMADOSCA: that he only came to get publicity

Pierco: @ForCaCaudina that he is a wh're

CHAT

MODERATORE: no insults!

RitmoLamantino: they're all the same

Giorgio13: have they given away the t-shirts yet?

ContoPapallo: what shirts are they giving out today?

GIGIA: but I've never swooned with a lecturer.

Propositivo06: no. No shirts

RitmoLamantino: swooned? how old are you @GIGIA

Giorgio13: They don't give away T-shirts?

falcomelico: they ran out of them

GIGIA: those are not questions to ask

SCREECH LIVE

LOOK, YOU SPEND TOO MUCH TIME ON SCREENS TODAY!

CHAT

ContoPapallo: but I wanted to buy a gift for my girl

Propositivo06: nonono they still haven't given them away

Giorgio13: @GIGIA I should not ask about the t-shirts?

GIGIA: you don't ask a lady her age

Contosudi3: BOOMER!

RitmoLamantino: the webcam has rebelled!

Pierco: hahaha lol!

Mondorumore98: hahahaha

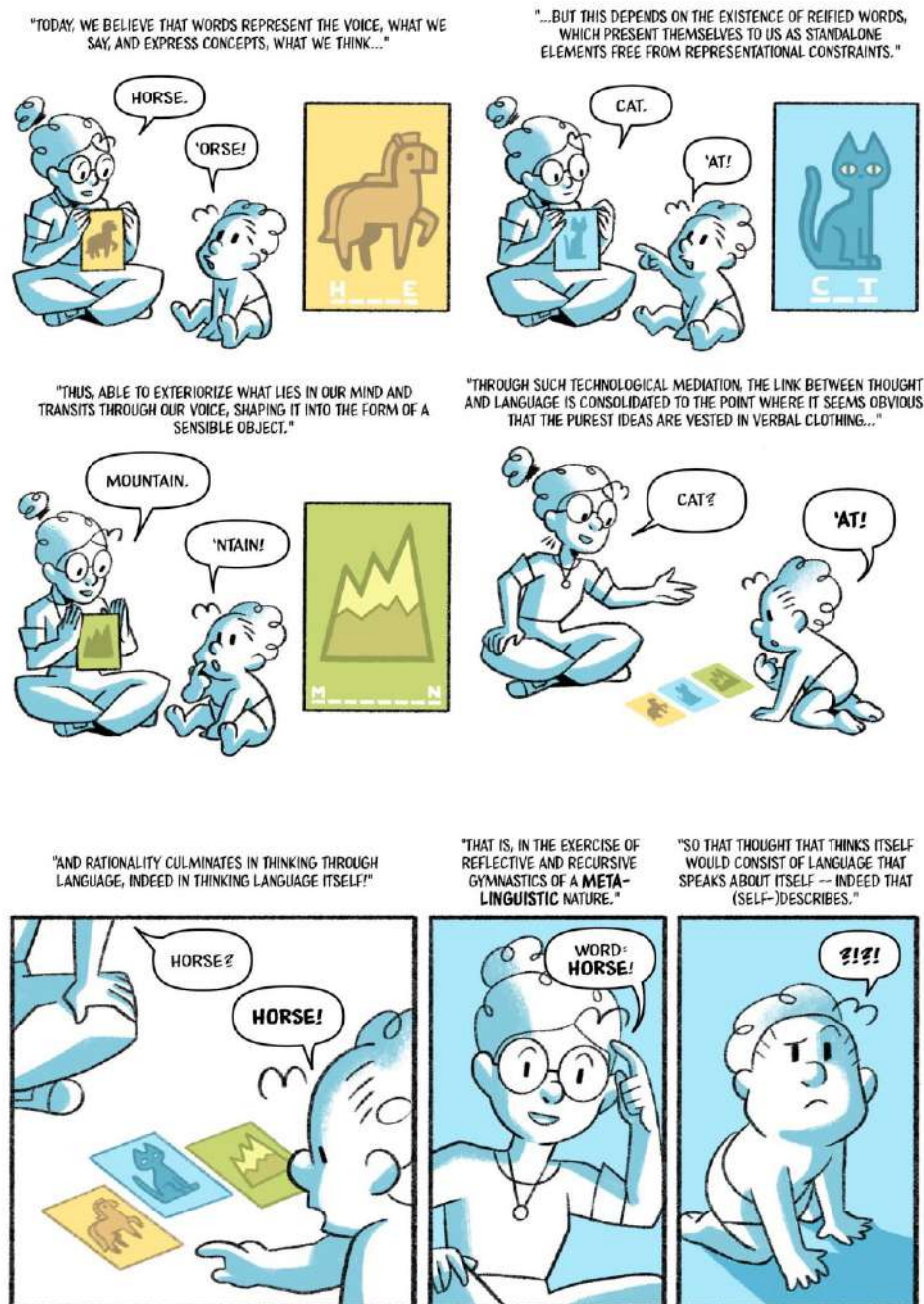
POVdelPugno: they given away the T-shirts yt?

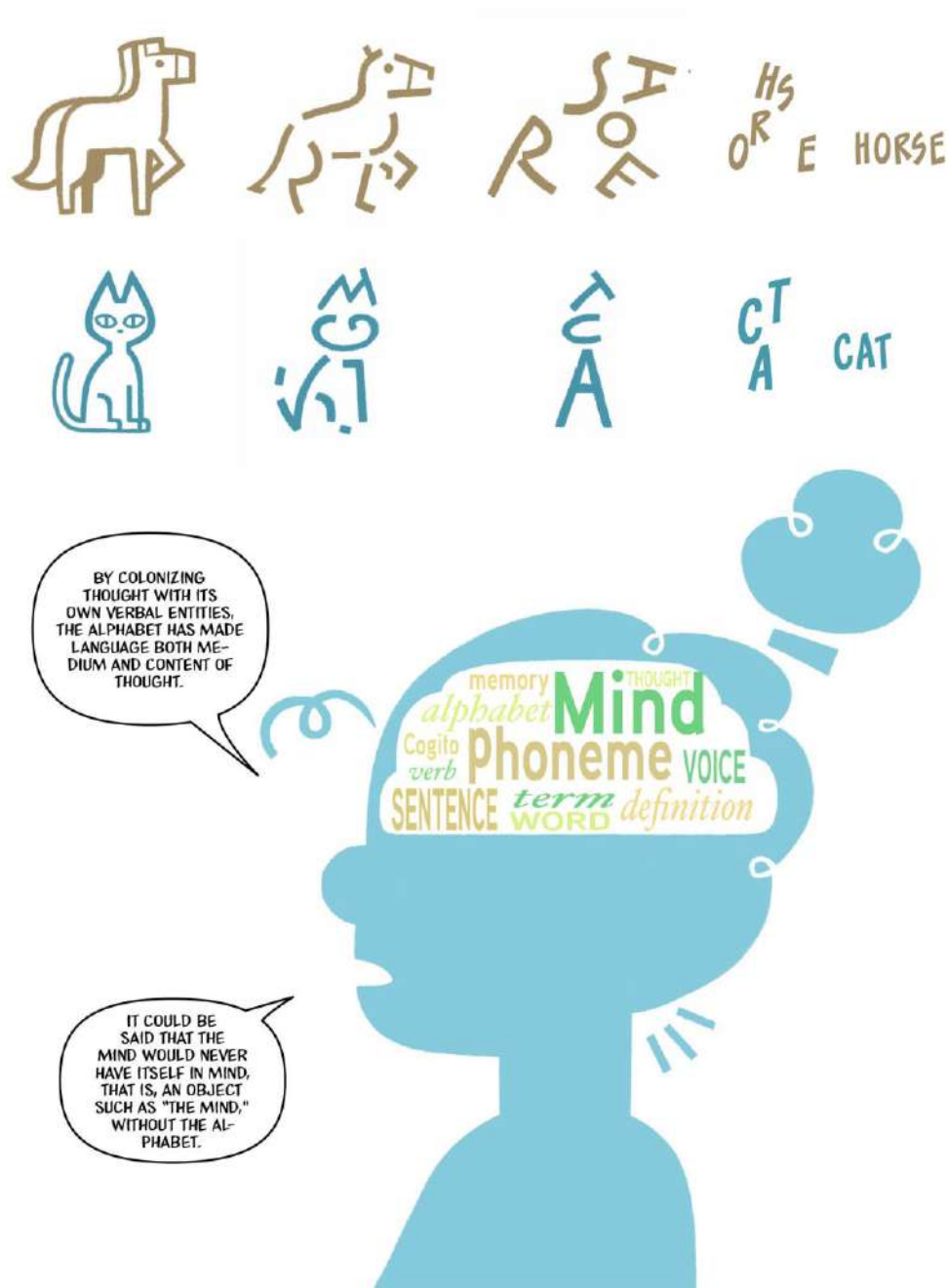
GIGIA:

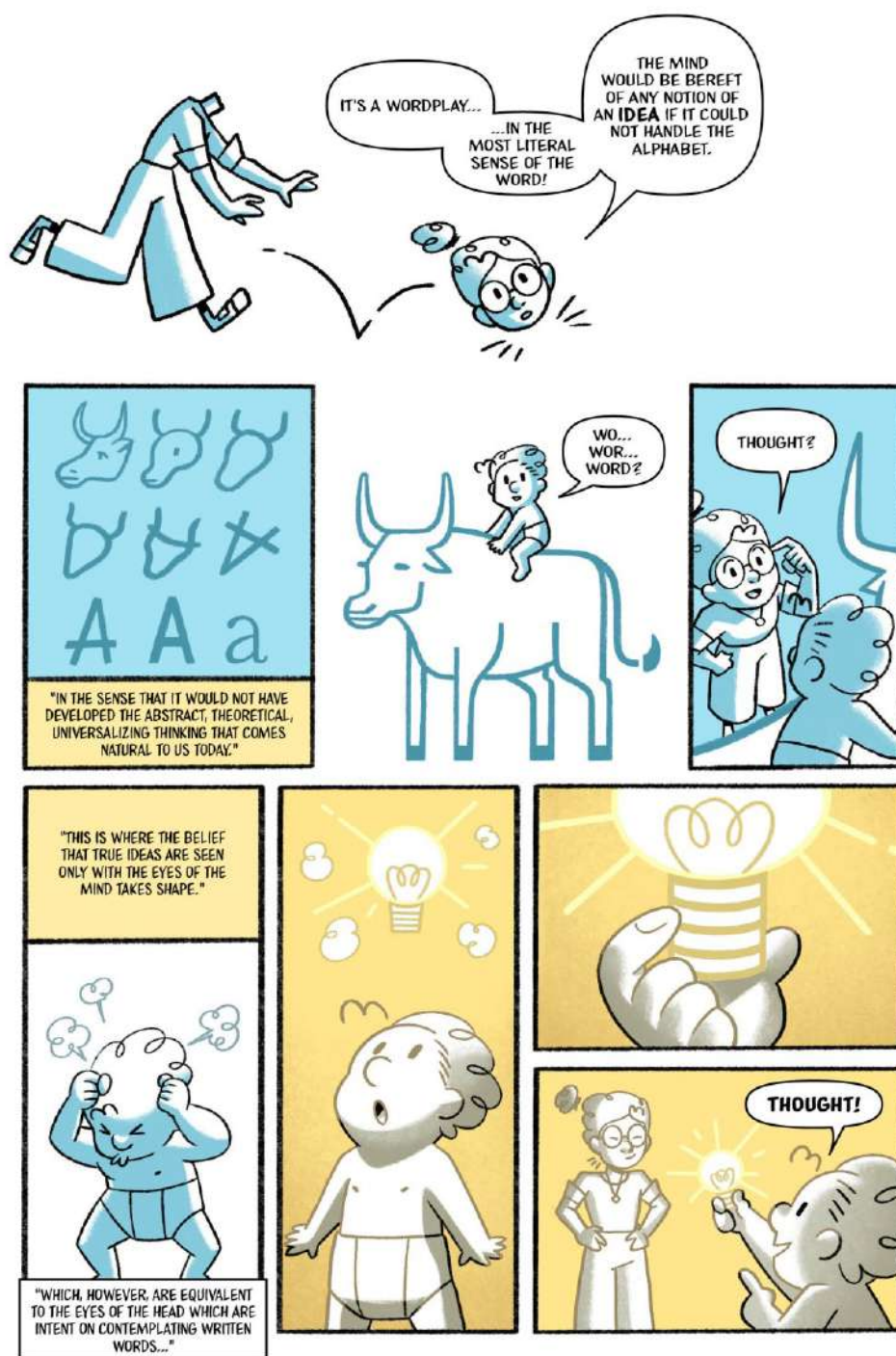


C) Figs. 9-13 [drafts from CS4]. A sequence exploring how the rational mind is shaped by the same alphabetic medium originally criticized by Plato/Socrates.











D) Fig. 14. A comparison between the final concept design of the character of the leading essayist and an earlier sketch of the same character created by a different artist during the casting phase.



Bibliography

Agamben, G. (2017). *The Fire and the Tale*. Engl. Trans. L. Chiesa. Stanford: Stanford University Press.

Antinucci, F. (2011). *Parola e immagine. Storia di due tecnologie*. Roma-Bari: Laterza.

Appiah, K. A. (2003). *Thinking It Through: An Introduction to Contemporary Philosophy*. Oxford: Oxford University Press.

Blumenberg, H. (2010). *Paradigms for a Metaphorology*. Engl. Trans. R. Savage. Ithaca, NY: Cornell University Press.

Burnett, R. (2005). *How Images Think*. Cambridge, MA: MIT Press.

Calabrese, S. & Zagaglia, E. (2017). *Che cos'è il graphic novel*. Roma: Carocci.

- Calabrese, S. et al. (2021). Elogio della *visual literacy*. *Enthymema*, XXVII, 90-113 (<https://doi.org/10.13130/2037>).
- Calvino, I. (1988). *Six Memos for the Next Millenium*. Engl. Trans. P. Creagh. Cambridge, MA: Harvard University Press.
- Calvino, I. (1997). Philosophy and Literature. In *The Literature Machine*. Engl. Trans. P. Creagh (39-49). London: Vintage.
- Camp, E. (2007). Thinking with Maps. *Philosophical Perspectives*, 21 (1), 145-182 (<https://doi.org/10.1111/j.1520-8583.2007.00124.x>).
- Carbone, M. & Lingua, G. (2023). *Toward an Anthropology of Screens: Showing and Hiding, Exposing and Protecting*. Cham: Palgrave Macmillan.
- Carr, N. (2020). *The Shallows: What the Internet Is Doing to Our Brains*. New York: Atlantic Books.
- Casati, R. (2013). *Contre le colonialisme numérique. Manifeste pour continuer à lire*. Paris: Albin Michel.
- Clowes, R. W. (2019a). Screen Reading and the Creation of New Cognitive Ecologies. *AI & Society*, 34, 705-720 (<https://doi.org/10.1007/s00146-017-0785-5>).
- Clowes, R. W. (2019b). Immaterial Engagement: Human Agency and the Cognitive Ecology of the Internet. *Phenomenology and the Cognitive Science*, 18 (1), 259-279 (<https://doi.org/10.1007/s11097-018-9560-4>).
- Cohn, N. (2013). *The Visual Language of Comics: Introduction to the Structure and Cognition of Sequential Images*. London-New Delhi-New York-Sidney: Bloomsbury.
- Cook, R. T. (2017). *Metacomics*. In F. Bramlett et al. (Eds.), *The Routledge Companion to Comics* (257-266). London and New York: Routledge.
- Cowling, S. & Cray, W. D. (2022). *Philosophy of Comics: An Introduction*. London-New Delhi-New York-Sidney: Bloomsbury.
- Danto, A. C. (1986). *The Philosophical Disenfranchisement of Art*. New York: Columbia University Press.
- Diamond, C. (1993). Martha Nussbaum and the Need for Novels. *Philosophical Investigations*, 16 (2), 128-153 (<https://doi.org/10.1111/j.1467-9205.1993.tb00456.x>).
- Drucker, J. (2020). *Visualization and Interpretation: Humanistic Approaches to Display*. Cambridge, MA: MIT Press.
- Eisenstein, L. (2005). *The Printing Revolution in Early Modern Europe*. Cambridge: Cambridge University Press.
- Eisner, W. (1990). *Comics & Sequential Art*. Tamarac: Poorhouse.
- Ellul, J. (1981). *La parole humiliée*. Paris: Seuil.
- Falzon, C. (2002). *Philosophy Goes to the Movie: An Introduction to Philosophy*. London and New York: Routledge.
- Fasoli, M. (2018). Super Artifacts: Personal Devices as Intrinsically Multifunctional, Meta-Representational Artifacts with a Highly Variable Structure. *Minds and Machines*, 28 (3), 589-604 (<https://doi.org/10.1007/s11023-018-9476-3>).
- Floridi, L. (2017). Digital's Cleaving Power and Its Consequences. *Philosophy & Technology*, 30 (3), 123-129 (<https://doi.org/10.1007/s13347-017-0259-1>).
- Floridi, L. (2019). *The Logic of Information*. Oxford: Oxford University Press.
- Flusser, V. (1997). *Medienkultur*. Frankfurt a.M.: Fischer.
- Gaita, R. (2004). *The Philosopher's Dog*. London and New York: Routledge.
- Gannon, L. (2002). A Critique of Evolutionary Psychology. *Psychology, Evolution & Gender*, 4 (2), 173-218 (<https://doi.org/10.1080/1461666031000063665>).
- Gazzaley, A. & Rosen, L. D. (2016). *The Distracted Mind: Ancient Brains in a High-Tech World*. Cambridge, MA: MIT Press.
- Goody, J. (1977). *The Domestication of the Savage Mind*. Cambridge: Cambridge University Press.

- Goody, J. (1986). *The Logic of Writing and the Organization of Society*. Cambridge: Cambridge University Press.
- Groensteen, T. (1999). *Système de la bande dessinée*. Paris: PUF.
- Grønstad, A. & Vågnes, Ø. (2006). An Interview with W.J.T. Mitchell, *Image & Narrative*, 15 (https://www.imageandnarrative.be/inarchive/iconoclasm/gronstad_vagnes.htm).
- Hague, I. (2014). *Comics and the Senses: A Multisensory Approach to Comics and Graphic Novels*. London and New York: Routledge.
- Han, B.-C. (2023). *Vita Contemplativa: In Praise of Inactivity*. Engl. Trans. D. Steuer. Cambridge: Polity Press.
- Harris, R. (2009). *Rationality and the Literate Mind*. London and New York: Routledge.
- Hartmann, F. (2000). *Medienphilosophie*. Wien: WUV.
- Havelock, E. A. (1986). *The Muse Learns to Write: Reflections on Orality and Literacy from Antiquity to the Present*. New Haven: Yale University Press.
- Holbo, J. (2012). Redefining Comics. In A. Meskin & R.T. Cook (Eds.), *The Art of Comics: A Philosophical Approach* (3-30). Oxford: Wiley-Blackwell.
- Hudson Hick, D. (2012). The Language of Comics. In A. Meskin & R.T. Cook (Eds.), *The Art of Comics: A Philosophical Approach* (125-144). Oxford: Wiley-Blackwell.
- Huizinga, J. (1936). *In the Shadow of Tomorrow: A Diagnosis of the Spiritual Ills of Our Time*. New York: W.W. Norton.
- Hummels, C. C. M. et al. (2022). Non-Discursive Philosophy by Imagining New Practices through Design. *Adaptive Behavior*, 30 (6), 537-540 (<https://doi.org/10.1177/10597123211006463>).
- Illich, I. (1993). *In the Vineyard of the Text: A Commentary to Hugh's Didascalicon*. Chicago and London: The University of Chicago Press.
- Jackson, M. (2008). *Distracted: The Erosion of Attention and the Coming of the Dark Age*. Amherst: Prometheus.
- Jonas, H. (1962). *Homo Pictor* and the Differentia of Man. *Social Research*, 29 (2), 201-220.
- Kittler, F. A. (2009). Towards an Ontology of Media. *Theory, Culture & Society*, 26 (2-3), 23-31 (<https://doi.org/10.1177/0263276409103106>).
- Kress, G. (2000). Design and Transformation: New Theories of Meaning. In B. Cope & M. Kalantzis (Eds.), *Multiliteracies: Literacy Learning and the Design of Social Futures* (153-161). London and New York: Routledge.
- Livingston, P. (2006). Theses on Cinema as Philosophy. *Journals of Aesthetics and Art Criticism*, 64 (1), 11-18 (<https://doi.org/10.1111/j.0021-8529.2006.00225.x>).
- Malafouris, L. (2007). Before and Beyond Representation: Towards an Enactive Conception of the Palaeolithic Image. In C. Renfrew & M. Iain (Eds.), *A Global Prehistory of Figurative Representation* (287-302). Cambridge: McDonald Institute of Archaeological Research.
- McClelland, T. (2019). Film as Philosophical Thought Experiment: Some Challenges and Opportunities. In C. Rawls, D. Neiva & S. S. Gouveia (Eds.), *Philosophy and Film: Bridging Divides* (92-115). London and New York: Routledge.
- McCloud, S. (1994). *Understanding Comics: The Invisible Art*. New York: HarperPerennial.
- McLaren, G. (2012). The Triumph of Virtual Reality and Its Implications for Philosophy and Civilization. *Cosmos and History: The Journal of Natural and Social Philosophy*, 8 (1), 383-411.
- McLaughlin, J., ed. (2005). *Comics as Philosophy*. Jackson: University of Mississippi Press.
- McLaughlin, J., ed. (2017). *Graphic Novels as Philosophy*. Jackson: University of Mississippi Press.
- Menary, R. (2007). Writing as Thinking. *Language Sciences*, 29 (5), 621-632 (<https://doi.org/10.1016/j.langsci.2007.01.005>).

- Mendelsund, P. (2014). *What We See When We Read*. New York: Random House.
- Meskin, A. (2009). Comics as Literature?. *The British Journal of Aesthetics*, 49 (3), 219-239 (<https://doi.org/10.1093/aesthj/ayp025>).
- Mirzoeff, N. (1998). What Is Visual Culture? In N. Mirzoeff (Ed.), *The Visual Culture Reader* (3-13). London and New York: Routledge.
- Mitchell, W. J. T. (1986). *Iconology: Image, Text, Ideology*. Chicago: The University of Chicago Press.
- Mitchell, W. J. T. (2014). Comics as Media: Afterword. *Critical Inquiry*, 40 (3), 255-265 (<https://doi.org/10.1086/677376>).
- Mol, A. (2022). Material Philosophy and the Adaptability of Materials. *Adaptive Behavior*, 30 (6), 517-519 (<https://doi.org/10.1177/1059712320984510>).
- Montani, P. (2020). The Imagination and Its Technological Destiny. *Open Philosophy*, 3 (1), 187-201 (<https://doi.org/10.1515/opphil-2020-0107>).
- Nilsson, J. A. (2024). *Cinecepts, Deleuze, and Godard-Miéville: Developing Philosophy through Audiovisual Media*. Edinburgh: Edinburgh University Press.
- Nussbaum, M. C. (1990). *Love's Knowledge: Essays on Philosophy and Literature*. Oxford: Oxford University Press.
- Olson, D. R. (1994). *The World on Paper: The Conceptual and Cognitive Implications of Writing and Reading*. Cambridge: Cambridge University Press.
- Olson, D. R. (2017). *The Mind on Paper: Reading, Consciousness and Rationality*. Cambridge: Cambridge University Press.
- Ong, W. (1982). *Orality and Literacy: The Technologizing of the Word*. London and New York: Routledge.
- Pasolini, P. P. (2005). The "Cinema of Poetry". In *Heretical Empiricism*. Engl. Transl. B. Lawton, L. K. Barnett (176-186). Washington: New Academia.
- Pezzano, G. (forthcoming). Playable Concepts? For a Critique of Videogame Reason. *Open Philosophy*.
- Pezzano, G. & Gualeni, S. (2024). How to Do Philosophy with Sci-Fiction: A Case of Hybrid Textuality. *Filosofia*, 69, 251-266 (<https://doi.org/10.13135/2704-8195/11205>).
- Pezzano, G. et al. (2024). *How to Do Concepts with Images: A Graphic Essay* [Manuscript submitting for publication].
- Postman, N. (1985). *Amusing Ourselves to Death: Public Discourse in the Age of Show Business*. New York: Viking.
- Rietveld, E. (2022). The Affordance of Art for Making Technologies. *Adaptive Behavior*, 30 (6), 489-503 (<https://doi.org/10.1177/10597123221132898>).
- Rietveld, E., & Kiverstein, J. (2022). Reflections on the Genre of Philosophical Art Installations. *Adaptive Behavior*, 30 (6), 589-602 (<https://doi.org/10.1177/10597123221133189>).
- Sanchez, C. A. (2011). Philosophy and Post-Immigrant Fear. *Philosophy and the Contemporary World*, 18 (1), 31-42 (<https://doi.org/10.5840/pcw20111814>).
- Sartori, G. (1998). Homo videns. *Televisione e post-pensiero*. Roma-Bari: Laterza.
- Simondon, G. (2017). *On the Mode of Existence of Technical Objects*. Engl. Trans. C. Malaspina & J. Rogove. Minneapolis: University of Minnesota Press.
- Simone, R. (2000). *La Terza Fase. Forme di sapere che stiamo perdendo*. Roma-Bari: Laterza.
- Sini, C. (2016). *L'alfabeto e l'Occidente. Opere. III.1*. Milano: Jaca Book.
- Sloterdijk, P. (2012). *The Art of Philosophy: Wisdom as a Practice*. Engl. Trans. K. Margo-lis. New York: Columbia University Press.
- Smith, M. (2006). Film Art, Argument, and Ambiguity. *Journal of Aesthetics and Art Criticism*, 64 (1), 33-42 (<https://doi.org/10.1111/j.0021-8529.2005.00227.x>).
- Sontag, S. (1973). *On Photography*. New York: RosettaBooks.

- Sousanis, N. (2015). *Unflattening*. Cambridge, MA: Harvard University Press.
- Spitzer, M. (2012). *Digitale Demenz*. München: Droemer.
- Stetter, C. (1999). *Schrift und Sprache*. Frankfurt a.M.: Suhrkamp.
- Türcke, C. (2012). *Hyperaktiv! Kritik der Aufmerksamkeitsdefizitkultur*. München: Beck.
- Valéry, P. (1976). Philosophy of the Dance. Engl. Trans. M. L. Pops. *Salmagundi*, 33-34, 65-75.
- Wartenberg, T. E. (2012). Wordy Pictures: Theorizing the Relationship between Image and Text in Comics. In A. Meskin & R.T. Cook (Eds.), *The Art of Comics: A Philosophical Approach* (87-104). Oxford: Wiley-Blackwell.
- Wartenberg, T. E. (2023). *Thoughtful Images: Illustrating Philosophy Through Art*. Oxford: Oxford University Press.
- Weigel, M. & Gardner, H. (2009). The Best of Both Literacies. *Educational Leadership*, 66 (6), 38–41.
- Wertham, F. (1954). *Seduction of the Innocent*. New York: Rinehart & Company.
- Wolf, M. (2007). *Proust and the Squid: The Story and Science of the Reading Brain*. New York: HarperPerennial.
- Wolf, M. (2018). *Reader, Come Home: The Reading Brain in a Digital World*. New York: HarperPerennial.

Invention and Metamorphosis Intelligence, Automated Optimization (AO) and the Prospect of Synthetic Intelligence with Simondon and Denizhan

Cécile Malaspina

Abstract. *Within the wider arc of Gilbert Simondon's philosophy, invention stands out as a stage in the development of mental images, rather than a faculty distinct from perception and memory. Of particular interest is a phase of transition that precedes invention in the development of mental images. Simondon compares this transition to the process of metamorphosis occurring in some species. This transition in the development of mental images is marked by the dedifferentiation of the dominant organizing principle. This dedifferentiation paves the way for the possible reorganization of mental images at a higher level of development. The free play of mental images corresponds to this transition, enabling the discovery of a new organizing principle with unprecedented possibilities of adaptation. It is enlightening for contemporary debates about machine learning processes, like those operative in Large Language Models or of image generation, to think carefully about this transition. In this article, we will look at the significance of this transitional dedifferentiation in living beings. This will lead us to argue against the use of the term Artificial Intelligence. A better alternative seems to be the term 'Automated Optimization' (AO) – suggested by the engineer and philosopher Yagmur Denizhan. Denizhan defines intelligence as the «border activity between the modelled and the unmodelled», i.e. between what is admissible in our model of reality and what is excluded or not yet encompassed by it. Intelligence thus conceived, I propose, is directly relevant to Simondon's analogy between invention and metamorphosis. The «border activity» between the modelled and the unmodelled, at the level of cognition, may thus correspond to free play of mental images in the strong sense, namely, as involving transitional dissolution of their organising principle. Without it, I argue, we cannot begin to understand the historical recasting of our mental worlds, including paradigm shifts in the arts, science and technology.*

Keywords. Simondon, invention, imagination, Artificial Intelligence (AI), Large Language Models (LLM).

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The metamorphosis of species like butterflies highlights key transitions in development. What is remarkable about the transitional morphological dissolution and dedifferentiation, paving the way for metamorphosis of the larva into the butterfly or sea urchin, is that something becomes explicit and visible to the eye, remaining implicit in other examples of ontogenesis. Yet it is no less critical, even if more implicit, say, in the development of the human child or in the historical transformations of societies. This transition is particularly relevant to our understanding of the distinguishing hallmark of human intelligence, namely, the role of the imagination. There is an analogy, Simondon argues, between metamorphosis and

the development of mental images, paving the way for invention. What they have in common is not a structural similarity, but an operational analogy: in both instances, the living being is jettisoning a hitherto dominant principle of morphological, physiological or other organization in order to bring about a new organizing principle. This is one of the many startling lessons students of Gilbert Simondon will have learned from his 1965-1966 lecture series at the Institute of Psychology in Paris. The lectures were published posthumously as *Imagination and Invention* and translated into English as recently as 2022 (Simondon 2022; 2008).

Simondon's analogy enables us to question today's labelling of Machine Learning processes as intelligent. Are they capable of jettisoning the model that acts as their organizing principle, and of recasting it in an entirely new form? The answer, at the time of writing, is no. Intelligence in living beings, I will argue, is derived from the capacity to reorganize and transcend pre-existing principles – a capacity absent in predictive processing algorithms. Today's analogy between human and artificial intelligence designates as intelligent a machine or algorithm whose output is human-like. Algorithms would thus become more intelligent as their output becomes more human-like. The analogy, however, is misleading to the extent that it is based on morphological similarity rather than analogy of operation.

In what follows, I will expand on and contextualise Simondon's analogy between metamorphosis and invention within the arc of his theory of individuation and with reference to Yagmur Denizhan's argument in «Intelligence as a border activity between the modelled and the unmodelled» (Denizhan 2023).

1. Metamorphosis and the free-play of mental images in the context of individuation

The purpose of this contribution is to foreground the contemporary relevance of Simondon's analogy between metamorphosis in some species and the process of invention occurring in other animal species, including and especially humans. Situating the invention within the wider arc of Simondon's theory of individuation, we will draw into focus the development of mental images as a process of individuation. Of particular interest is Simondon's attention to the transitional phase that implies a dedifferentiation of the hitherto dominant principle of organization, preceding a significant reorganization at a higher level, affording novel adaptations. This transition is the basis for Simondon's analogy between invention and metamorphosis, as between two processes with operational equivalence. It is not a false analogy between two structurally or otherwise similar phenomena. The contrast intended here is between the operational analogy of critical transitions in otherwise different beings – the larva's morphological metamorphosis and the recasting of an organizing principle in the act of invention – *versus* the false analogy, based on similarity, for instance between texts produced by humans and the human-like output of Large Language Models (LLMs).

The term individuation is too frequently treated as synonymous with ontogenesis. Before indicating some peculiarities of the concept of individuation, let me sketch out the broad outlines of ontogenesis. The term ontogenesis refers, in part, to a term coined by the 19th century biologist Ernst Haeckel to posit the development of the organism (also ontogeny), from fertilization to maturity, as a recapitulation of the species' evolution (phylogeny). For Simondon, on the other hand, an account of "veritable" ontogenesis must encompass the genesis and becoming not only of the individual or the species but of the system within which individual and milieu co-emerge and co-evolve (Simondon 2020a, 3).¹ The individual

¹ For a contemporary philosophical rehabilitation of context, see Juarrero (2023).

is only a partial result of this veritable ontogenesis. In a more speculative sense, ontogenesis hails from the Pre-Socratic conception of the productive dynamism of *physis*, the becoming of nature and continual and reciprocal transformation of elements. (Simondon 2020a, 364-365).

While he does define ontogenesis as a process of individuation, he also specifies that not all processes of individuation result in ontogenesis. Not all processes of individuation bring about a fully individualized entity that remains topologically fully distinct from its milieu. Individuation may also refer to a process of continuous variation of form, as for instance the continuous modulation of a radio signal or the swirls in a river. Individuation designates the processual genesis (within preindividual being or, more narrowly, within an existing system that is not fully determined) of an entity or process whose uniqueness is individual in the sense of its singular *thisness* in the *here and now*.

Individuation weights the attention towards the *individuating individual*, while ontogenesis draws our attention to the genesis of the *individuated individual* as an entity distinct from the milieu. Spinoza's distinction between *natura naturans* and *natura naturata* may be helpful to render this difference more intelligible. The *individuating individual* may be a continuous variation of form, in mid-flight, not necessarily resulting in an *individuated individual*. The *individuated individual*, on the other hand, would be this partial result of ontogenesis properly conceived, that is, the by-product of the becoming of being in the most generic sense, and more particularly the by-product of the genesis of a system wherein the distinction between individual and milieu arises.

In *Imagination and Invention*, Simondon uses the term metamorphosis to refer rather more straightforwardly to a stage in the development of an organism. While the metamorphosis of the larva results in the ontogenesis of the butterfly, it is worth keeping in mind here the implicit idea that the development of mental images may involve more open processes of individuation, as variation of form. With these nuances in mind, let us turn towards *Imagination and Invention*. Here Simondon refers to the organism as host to a plurality of secondary individuations happening concurrently, but not in perfect synchronicity. The maturation of different physiological systems occurs at an uneven pace. In this poly-rhythmic development occur transitional dedifferentiations and reorganisations:

Studies of ontogenesis have shown that growth processes do not cover the organs and functional systems of a living being in a uniform way: there are lags in each partial growth relative to the others, and there are different speeds, especially among complex organisms, so much so that it is difficult to establish the exact moment at which an organism reaches its complete adult stage; moreover, growth and development display stages and cycles, separated by periods of transition in which a dedifferentiation is followed by a reorganisation. Such processes are very clear in the metamorphoses of some living species, yet they also take place in the organic development and the ontogenesis of human behavior. (Simondon 2022, 18).

Ontogenesis, then, is composed of a plurality of layered and nested secondary individuations, whose development is complex and polyrhythmic, punctuated by transitional dedifferentiations, as in metamorphosis and in the free play of mental images. Simondon defines the development of mental images as a secondary individuation constituting a structural and functional subset of psychic activity, which is itself a secondary process of individuation within the organism. «Could we not then posit that mental images are like structural and functional subsets of this organized activity that is psychic activity? These subsets would thus possess a genetic dynamism analogous to that of an organ or a system of organs on a trajectory of growth [...]» (Simondon 2022, 18).

Mental images, as structural and functional subsets of the psyche's organized activity, thus possess a genetic dynamism of their own with an intrinsic growth and development analogous to that organ. Like the genesis of organs, the genesis of mental images obeys

developmental stages: from the embryonic stage of spontaneous growth to becoming a source of pre-adapted response schemas in anticipation of stimuli from the milieu, and from their increasingly functional role in movement and perception, mental images finally organize themselves in a veritable “mental world” with its own constraints and topology. This last stage, crucially, results not in a mirror image of the experienced milieu, not in a representation of an *extra mental* reality.

[...] first, that of pure and spontaneous growth, prior to the experience of the object to which a functional activity is pre-adapted; this would be, in the image, the equivalent to the embryonic stages of organic growth; each image, as an embryo of motor and perceptual activity, develops itself for itself here as a non-controlled anticipation, through reference to the experience of the milieu, and to a free state, which is to say without strict correlation to other subsets of psychic activity. It displays pre-adaptations but not adaptations. The image then becomes a mode of receiving (*accueil*) information coming from the milieu and a source of response schemas to these stimuli; in perceptual-motor experience, images become effectively and directly functional; they organize and stabilize themselves in internally correlated groups according to the dimensions of the relationship between the organism and the milieu. Finally, after this stage of interaction with the milieu corresponding to a learning process (*un apprentissage*), an affective-emotional repercussion completes the organization of images according to a systematic mode of linkages, evocations, and communications; a veritable mental world is constituted, with regions, domains, qualitative key points through which the subject commands *an analog of the external milieu*, one that has its own constraints, its own topology, its complex modalities of access. (Simondon 2022, 18-19, emphasis in the original).

Mental images are not mere aggregates of sensory data. They are not a reflection, or mimetic representation but obey an operating principle analogous to that of the experienced milieu. Perception thus finds its place in the organized activity of the psyche and within it, in the organized development of mental images. From one developmental stage to another, mental images progress towards greater integration, more tightly organized systematic interdependences and towards a saturation of inter-linkages. The interdependencies between mental images are increasingly tight-knit as experience of the environment progressively specifies these linkages, and generates an entirely new set of affordances: the basic adaptations having been accomplished, a window of opportunity opens up for a free play of mental images, but at a higher level of adaptation.

In other words, images would undergo successive mutations that would modify their mutual relations by making them pass from the status of primitive mutual independence to a phase of interdependence at the moment the object is encountered, to a final state of systematic and necessitating linkage in which primitively kinetic energies have become tensions within a system. Invention could then be considered as a *shift in the organization* of the system of adult images, returning mental activity to a new state of free images, through a change of level, thus allowing a genesis to start again: invention would be the rebirth of the cycle of images, one that permits an approach to the milieu with new anticipations from which adaptations will emerge that were not possible for primitive anticipations, and then a new internal and symbolic systematization. In other words, invention operates a change of level; it marks the end of a cycle and the beginning of another, each comprising three phases: anticipation, experience, and systematization. (Simondon 2022, 19, emphasis in the original).

The mental is thus an active constructive organization of possible experience forming a system for the reception of signals and information coming from the milieu, and a source of schemata for responding to stimuli. The saturation or maturation of this system paves the way for its possible metamorphosis through the free play of mental images.

We already encounter the idea of dedifferentiation in *Form, Information, and Potential*, a conference paper presented before the Société Française de Philosophie in 1960

(Simondon 2020b, 672-697). In this text, Simondon cites the American psychologist and paediatrician Arnold Gesell, who first proposed that all children go through a set of concurrent developmental stages, in a sequence largely influenced by the maturation of their nervous system. Gesell's observation concerning embryology, growth and behavioural development, foregrounds the apparent dedifferentiation of already acquired adaptive adjustments during periods of transitions between stages, entailing crises of self-regulative fluctuations and periods of relative disadaptation. The infant, for instance, develops a first pattern of waking at night, but suddenly «wakes at any moment whatsoever and seeks nourishment when it cries». Then, «all of a sudden, it *restructures* its activity», but based on fewer meals per day: «The schema is clear [...] the disadaptations mark a moment in the search for a new structure» (Simondon 2020b, 690-691). The initially acquired «patterns», i.e. the initial adaptation, seem lost, but, in fact, they are reincorporated into the new adaptation. The process of maturation as a whole generates new *tendencies*, new adaptations, but also new demands.

The analogy with metamorphosis in *Imagination and Invention* finds a wider context in this text, which Simondon concludes with reference to Carl Jung's theory of individuation, couched in the language of alchemy. The crisis of dedifferentiation is defined by the notion of *Liquefactio* (dissolution) and even *Nigrefactio* (putrefaction). In this crisis, «substances lose their limit and their individuality, their isolation», paving the way for a new differentiation, the «*Cauda pavonis* or peacock's tail», where objects emerge «from the confused night». Jung considered dedifferentiation to constitute a necessary sacrifice, enabling the return to a state «comparable to that of birth» (Simondon 2020b, 696-697).

The process of dedifferentiation, Simondon argues, serves to reconstitute the systems of potentials, i.e. it signals the return to «a richly potentialized, not-yet-determined state». The «somewhat liquidated elementary schemas» correspond, within Simondon's greater arc of individuation, to an increased metastability, a greater susceptibility for sudden change or structuration around a novel principle of organization. Metastability, like a basketball spinning on our finger, is a fragile state of equilibrium that is prone to transformation. This metastability provides the potential for transformation, contained in the tension between disparate aspects of reality. While thermodynamic potential is a theme that is paramount, Simondon extends his concept of «disparation» to any disparity that can act as a tension. A very different example would be the binocular disparity between the left and right eye, whose resolution leads to the perception of depth. The metastability that this tension fuels constitutes what Simondon calls a «first information». This must not be misconstrued as a primordial source of information but should be understood as a condition of possibility of individuation. This first information or condition of possibility is draw, in the largest sense possible, from what Simondon defines, in Ionian fashion, as the *apeiron*, the unbounded and indeterminate, from which Anaximander makes every individuated form emerge: «[T]he Ionian physiologists found in nature the origin of all types of being prior to individuation; nature [...] his ἄπειρον [*ápeiron*] [...] would remain in the individual, like a crystal that retains its mother liquor, and this charge of ἄπειρον would allow it to go toward a second individuation» (Simondon 2020a, 343).

Whatever triggers the transformation of a preindividual metastable state acts as information broadly conceived. It may occur in the manner of an event, of an entity, like the grain of dust in the pre-crystalline solution, or as a threshold of intensity that is crossed, for instance when the tension in the atmosphere is discharged in the transitory individuation of a lightning bolt. Information is this singularity or event that brings about a tipping point, that provokes a bifurcation or phase transition in the system. It is defined by its singularity in the here and now, its *haecceity* or thisness, and by the affinity of this haecceity with the given potentials. A grain of sand may trigger the crystallisation of an oversaturated solution, but be of no such consequence on a sandy beach.

Information is the *tension of form*. It corresponds to the metastability of a system, to its potential transformation, together with whatever entity or event is singularly suitable to trigger individuation, to trigger the ontogenesis properly conceived, that is, the ontogenesis of a system, giving rise to the individual form, its milieu, and the dynamic relation between. Information is thus the encounter of this condition of tension with an event or entity capable of catalyzing transformation. I insist on this point, in view of our discussion of so-called Artificial Intelligence: ontogenesis, *veritable* ontogenesis, is not the emergence of an entity, not only, it is the emergence of a system where there was none. The event or entity that catalyzes the process of individuation mediates the tension between hitherto disparate aspects of reality. This mediation, via the nascent individual, establishes the communication between hitherto independent aspects of reality and thereby brings about a system where there was none (or a novel system within an existing system). Information, in Simondon's sense, is never a given, a *datum*. Information must satisfy the three conditions of first information (disparity, tension, potential; metastability), a catalyzer (affinity of an entity or event with the given tension) and the emergence of a system wherein hitherto independent disparate aspects of reality communicate: emergence of a phase, of chrono-topology distinguishing inside and outside, before and after, individual and milieu.

Information, thus conceived, cannot be conflated with the data that is fed into programmes like LLMs. To inquire into the intelligence of algorithms, within Simondon's framework of individuation, requires a careful transposition of the criteria of individuation onto the matter of man-made machines that operate, with margins of indeterminacy, within existing systems. The transitional dedifferentiation in metamorphosis, in the infant's development and in the free play of images, is but the living being's singular capacity to regenerate its tension of form. In what way can we speak of information, of tension of form and of the capacity to regenerate tension of form in relation to an algorithm that is, essentially, a programmed, predefined rule with a finite margin of play?

2. Intelligence as a Border Activity Between the Modelled and the Unmodelled

To what extent, if at all, might one imagine an organism as dissolving its organizing principle, its own code, in such a manner that another novel principle of organization may emerge, one affording a novel and greater adaptive functionality? To what extent this is true for our genome, our proteome, our hormones and neurotransmitters, our reflexes and earliest imprints, for the *mille-feuille* layers of our physiological, psychological and socio-cultural principles of organization? From evolution to contemporary culture, every layer of this complex individuation testifies to degrees of freedom, at different time scales, in reloading the tension of form. The tension of form, for the living being, indelibly links its multi-dimensional and polyrhythmic individuations to the wider ontogenesis of a system formed by the genesis and co-evolution of individual and milieu.

Can an algorithm compare with the organism's multidimensional, polyrhythmic and open-ended complexity of organization? How might one define an algorithm's resilience to a transitory dedifferentiation and ensuing disadaptation? Is it at all possible to extend Simondon's analogy between metamorphosis and the free play of mental images to the models of reality that are programmed into the algorithms that power machine learning?

Yagmur Denizhan – Professor in Chaos control, Modelling of nonlinear dynamic systems at Boğaziçi University in Istanbul and a bio-semiotician – distinguishes between the capacity of living beings to expand their model of reality and the predefined, model-based operations of machines (Denizhan 2023). In computer science, the model is a mathematical or computational representation of a predefined system on which the algorithm will be based. The model is a simplified representation of a complex system. It encapsulates features

essential for specific tasks, enabling prediction, understanding, or control, be it as the basis of software applications for users or be embedded in robotic systems, for instance of a robotic arm adjusting its grip. The architecture of the model may be that of a linear regression, for instance, predicting continuous output. A decision tree, on the other hand, enables the classification and regression of tasks. The architecture of a model may be convolutional, as in neural networks for image recognition, or recurrent, dealing with time-series and sequential data etc. In all instances, the model selects and defines key parameters in accordance with the objective to simulate a specific aspect of reality, while ignoring other parameters. Based on this model, the algorithm is a set of rules, using symbols or logic, for the execution of specific tasks, for instance to process data in order to make predictions or decisions.

To date machines operate within the fixed, predefined models. These models are typically designed to be capable of adapting to changing inputs. However, Denizhan points out, this adaptation is limited to finite, set parameters. The machine cannot expand the scope of these parameters beyond their original design. In other words, technological systems, to date, use models with fixed ontologies, with a finite ability to adapt beyond what has been programmed. While so-called artificially intelligent models can adjust certain parameters, they cannot undergo significant change without external intervention. In other words, while some parameters are free to accommodate feedback, this freedom has little to do with the philosophical considerations of freedom as self-determination or *libre arbitre* that have animated millennia of debates in ethics, political theory, theology or, for that matter, ethology. In contrast, cognitive models in humans are dynamic, evolving structures that can grow or reorganize through interaction with others and the environment.

Human cognition, of course, generates models of reality and not only those for computer science. Our models of reality form part of an evolving knowledge structure, which Denizhan refers to as the «Edifice of Knowing». The most recent additions may adapt more fluidly, accommodating new experiences and expanding the individual's understanding of the world, while older strata, like reflexes, are more inflexible. Denizhan categorizes cognition into two distinct modes: mode "A" represents routine, predictable operations that rely on fixed knowledge models. Mode "B", on the other hand, involves higher level cognition involving creativity, uncertainty, and new ontological categories. Mode B engages with uncharted, as yet unmodelled aspects of reality. Mode B is not merely about processing what occurs within predefined parameters for information, but about restructuring and expanding the model of reality creatively.

This level of problem solving requires the transformation of the operative model of reality to expand into the unmodelled. The unmodelled is not a space or uncharted territory beyond some imagined topographical boundary of the explored. It represents rather the unknown aspects of reality, the aspects that are not included in a system's model of reality or cognitive framework. The unmodelled refers to dimensions of reality that the current model cannot grasp and, crucially, does not know it cannot grasp until confronted with problems that require intelligence to tackle the boundary of the model and the unmodelled.

The modelled and the unmodelled interact dynamically. New information can reshape the current model, incorporating previously unknown elements. Denizhan defines this as the capacity for «ontological expansion». By this account, engaging with the unmodelled is a hallmark of higher-level thinking, such as creativity and innovation. Denizhan posits this as a criterion for the distinction between the intelligence of living beings and the processes of «automated optimization» (A.O.) that characterise what is commonly called Artificial Intelligence (A.I.).

In a forthcoming paper entitled *Synthetic Mutations, Mistakes, and Glitches* (Lu, forthcoming) computer scientist and philosopher Christina Lu has, independently from

Denizhan, proposed the notion of «ontological stasis» to define the limitations of Machine Learning models, which remain fixed once trained, and unable to adapt to unforeseen changes, notably those occurring in society. Current Machine Learning systems, she argues, also suffer from training isolation: models are trained in isolation, reinforcing initial biases and preventing adaptation to new data. They also suffer from what she calls «Error Eradication». By eliminating errors, Lu argues, the programmers deprive models of the creative discoveries and evolution fuelled by mistakes.

Lu looks towards biological evolution to speculate about future «synthetic evolution» through the deliberate introduction of mutations and mistakes in AI models, which may eventually allow them to evolve and adapt dynamically. This speculative perspective may indeed open a horizon in which the ontological stasis may give way to an «ontological dynamism» of co-evolution of models and their environments, by incorporating «unknown unknowns».

Are recent developments, from Generative A.I. to Meta-Learning and Evolutionary Algorithms satisfy the criterion of ontological expansion? They certainly show how abundant the margin of play of the algorithm's free parameters is.

Generative Adversarial Networks (GANs) and Large Language Models (LLMs) like ChatGPT-4 discover patterns in complex distributions of enormous amounts of existing data publicly available on the internet, using “billions of parameters”. Recurrence in words, sentences, and sequences enables them to statistical chunks with predictability, yielding patterns on the basis of which the LLM can predict what might come next. Sonia de Jager has shown, with the example of Winograd schemas, how susceptible LLMs are to encoding bias when dealing with ambiguity in language, in contradistinction to the way languages and cultures evolve on the basis of ambiguity (de Jager 2023).

There are generative adversarial networks (GANs) that pit two models against one another: the model generating output tries to “fool” the model that learns to discriminate “real” data from generated data, thus continually improving both. Or diffusion models, used in text-to-image generation, iteratively refine output that resembles samples in the training dataset. Transformer architecture models, in turn, encode words in a corpus of text as a “token” for an “attention map” enabling the model to work with context (Zewe 2023). Leveraging extremely large, high-dimensional and complex search spaces, using “population-based” search techniques allow more recent developments in evolutionary computation not only to model and reconstitute versions of existing data, but to propose solutions to problems (Miikkulainen 2021). Evolutionary computation is perhaps the closest to Lu's wish for ontological dynamism. Extremely large, high-dimensional and complex search spaces, requiring substantial computational resources, are leveraged to evaluate large populations of candidate solutions to a problem. The population of candidate solutions evolves over successive generations, starting with a random iteration of candidate solutions, followed by iterative evaluations using operators like crossover (combining parts of two solutions) and mutation (introducing random changes).

While this method is prolific at generating potential solutions to a given problem, we may still ask whether these algorithms, as formidable as progress in this area is, have the remit of something like a metamorphosis or critical transition involving dedifferentiation of the model in view of a potentiated tension of form and the generation of an entirely new model at a higher level of adaptation. Can evolutionary computation be designed in a manner that allows the algorithms to expand from the modelled into the unmodelled?

The simpler question that seems worth asking is whether, in this evolutionary adaptation of solutions to a predefined fitness function, also the programmed fitness function can be revised without human input. The history of political ideological appropriations of Darwin's theory of evolution, notably in the domain of statistics and eugenics, should sound a warning about how badly things can go with an ill-conceived concept of fitness. Can an

algorithm designed to solve a given problem become an algorithm that identifies hitherto unknown problems or even inventing new problems, as philosophers, mathematicians, scientists, inventors and artists have done for millennia? Is computational computation designed to expand, eventually, from the given, the data set, into the truly virtual? By virtual I do not mean the representations and simulations animating user interfaces, nor the myriads of digital processing operations invisible to the user, but the domain of the possible which cannot be confined to the actual, to what is given and can be converted into data.

The open-ended expansion into the field of possible experience is characteristic of both biological evolution and socio-cultural historicity. In Simondonian terms this openness resides in the *ἄπειρον* (*ápeiron*), the unbounded and indeterminate state of being which is the condition of possibility of individuation. What might be its analogon with respect to the data sets upon which the algorithm exercises its predetermined tasks or fitness functions? This entails the question concerning the conditions of possibility of experience *per se* and of the experience of novelty, which is to a certain extent the same. In metamorphosis and invention, what is at stake is the alteration of the conditions of possible experience, of what can become a datum of experience, and also of what counts as a possible datum of experience or is discounted as noise. How does this criterion change the question regarding intelligence and learning, the use of models of and schematizations of reality and their limits in living beings and in human made machines?

Conclusion

To what extent is the analogy between intelligent cognition in living beings and the «automated optimization» of machines warranted? I propose that the analogy is not unhelpful if we compare how algorithms operate to what Denizhan defines as mode “A”, i.e. in predictable, routine operations relying, respectively, on fixed knowledge models. In a number of respects, digital technology has already outpaced the cognition of living beings in mode “A”. The processing speed of digital processes, measured in gigahertz or billions of cycles per second, far outpaces the 80-120 meters per second (m/s) action potentials of some neurons. Parallel processing of tasks, scope of data analysis, memory storage and recall, as well as image recognition and natural language processing are domains in which the automated optimization of these processing tasks outperforms a human individual. Complex models, like climate or multidimensional datasets about the economy (e.g., genomics, financial markets), can be processed almost instantaneously and indefinitely by machines (energy supply permitting). An algorithm may process medical records and perhaps even communicate with patients to their greater satisfaction than a human doctor. It can translate most texts satisfactorily across dozens of or identify financial market trends and execute transactions in microseconds, without factoring in human limitations due to fatigue, cognitive overload, physiological or psychological conditions.

It may seem appropriate to speak of artificial intelligence with respect to the automated optimization of processes analogous to mode “A”, and in narrowly defined tasks, where digital technologies outpace the human in brute-force computation. However, Denizhan singles out a weakness in the analogy: the human chess player deploys a creativity that adapts to the means at its disposal. Creativity enables the truly intelligent being to leap over the computation steps. What characterizes human intelligence and creativity within relative scarcity of resources, when compared with the computational power, memory and speed of the machine. While the output may be similar, to a certain extent, the operational logic and the principle of organization are different.

However, algorithmic automated optimization may inform our conception of intelligence differently than commonly assumed. Rather than boxing intelligence into the

framework of sophisticated automatisms by comparing their intelligence, these technologies do oblige us to reconsider the legacy of historical approaches to development, education, and work. If these have traditionally exalted the sophistication of cognition in mode “A” of cognition, doing so at the expense of genuine intelligence, then we may now need to bring about a transition towards a culture in which development, education, and work value and foster, rather than stultify, neglect, and squander, intelligence in mode “B”.

Metamorphosis and invention are problems of individuation. One could also say they are about the individuation of a new problem. The question whether metamorphosis and invention are the expression of intelligence is speculative and implicit, if we consider metamorphosis as the fruit of evolution and phylogenesis. It is explicit, yet not less speculative, if we consider the problem-solving of intelligence of living individuals, be they singular or collective. From the formidable complexity of the unicellular organism to the cultural complexity of humans, including but not limited to *techne* in the arts and technology, problems of vital importance are not only solved, but new problems are individuated: not only those that are accidentally brought about as an unintended consequence of solving another, but also those that are disclosed, if not invented as horizons for future individuation. The invention of a problem is ultimately, like metamorphosis, about the potentiation of a living being’s tension of form. Herein lies, essentially, the difference between the execution of a task and its problematization.

The nature of the problem must be thought in the context of the ultimate problem, namely that of a veritable ontogenesis: not the solving of a problem within a given system or regional search space therein, but with regard to the genesis of a system. Information in this regard is not only about processing data, but about individuation. To understand the role of information in individuation we must think about the genesis and evolution not only of the individual, not only of the individual/milieu coupling, but of a system where there was none. Simondon and Denizhan leave us with the following question regarding processes of Automated Optimization: are we dealing with processes capable of tapping into the preindividual, that is, into the truly infinite, unbounded and indeterminate?

Bibliography

de Jager, S. (2023). Semantic Noise and Conceptual Stagnation in Natural Language Processing. *Humanities and Social Sciences Communications*, 10 (Generative approaches to noise: towards a new paradigm in the humanities and social sciences). (<https://www.nature.com/articles/s41599-023-01643-9>).

Denizhan, Y. (2023). Intelligence as a Border Activity Between the Modelled and the Unmodelled. *Angelaki*, 28 (3), 25-37. (<https://doi.org/10.1080/0969725X.2023.2216542>).

Juarrero, A. (2023). *Context Changes Everything: How Constraints Create Coherence*. Cambridge, MA: MIT Press.

Lu, C. (forthcoming). *Synthetic Mutations, Mistakes, and Glitches: Evolving Machine Learning From Ontological Stasis Towards Unknown Unknowns* [Shared Privately with the Author].

Miikkulainen, R. (2021). Creative AI Through Evolutionary Computation: Principles and Examples. *SN Computer Science*, 2 (3), 163. (<https://doi.org/10.1007/s42979-021-00540-9>).

Simondon, G. (2008). *Imagination et invention (1965-1966)*. N. Simondon, (Ed.). Chatou: Éditions de la transparence.

Simondon, G. (2020a). *Individuation in Light of Notions of Form and Information: Volume I*. Engl. Trans. T. Adkins. Minneapolis: University of Minnesota Press.

Simondon, G. (2020b). *Individuation in Light of Notions of Form and Information: Volume II: Supplemental Texts*. Engl. Trans. T. Adkins. Minneapolis: University of Minnesota Press.

Simondon, G. (2022). *Imagination and Invention*. Engl. Trans. J. Hugues & C. Wall-Romana. Minneapolis and London: Univocal & University of Minnesota Press.

Zewe, A. (2023). Explained: Generative AI. *MIT News*, November 9, 2023 (<https://news.mit.edu/2023/explained-generative-ai-1109>).

Phantasy, Technology, Critique On Bernard Stiegler's Pharmacology of the Imagination¹

Antonio Oraldi

Abstract. *Bernard Stiegler's philosophy of technology gives a central role to the imagination. Among the philosophers with whom he establishes a critical dialogue (Kant, Simondon, Adorno, Derrida), Husserl's reflections on memory, imagination and phantasy count as decisive influences on Stiegler's critique of the industrialized imagination in *Technics and Time*. This paper begins by briefly introducing Stiegler's anthropological account of technics, in which technics is understood as an exteriorization of memory (1998). I will reconstruct how Stiegler's critique of Husserl substantiates the role of technics as memory through the concept of tertiary retention, while his critique of Kant connects technical mediation with the schematic function of imagination. Next, I will examine Stiegler's critique of the industrialization of the imagination as part of a cultural industry (2011). Although the politicization of the technologized imagination is not entirely new (Marcuse 1968), Stiegler's account displays original elements. If technical objects and media function as supports for memory and imagination, then the imagination is not merely an internal, unconstrained, and individual faculty, but it is decisively formed in the interplay between subject and milieu with its associated power relations. Thus technology, for Stiegler, stands as a pharmakon – both cure and poison – of memory and imagination. I will argue that for social critique in the contemporary age, Stiegler's notion of exteriorized imagination highlights the political stakes in the co-constitutive relation between imagination and technical media. Furthermore, the conception of imagination as a partly technical faculty also invites reflections on digital reality and developments in AI (Romele 2020; Wellner 2022a). Ultimately, this perspective provides a standpoint to view imagination as a transformative political faculty, which reflects the structure of desiring subjects in their movement toward the future.*

Keywords. Stiegler, imagination, technology, externalization, industrialization.

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Introduction

This paper aims to reconstruct the relationship between technology and imagination in Bernard Stiegler's philosophy, focusing primarily on *Technics and Time*, while also highlighting the elements of social critique inherent in this conception and its role within a broader project of social transformation. While being neither a phenomenologist nor a critical theorist strictly, but rather an eclectic thinker of the technical condition, Stiegler develops a "pharmacology" of the imagination that underscores the co-constitutive and metastable

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relation with technical artifacts and systems. In his philosophy of technology, Stiegler accords a central role to imagination. Across the *Technics and Time* series, he develops a nuanced account of the relationship between imagination and technology through critical dialogue with key figures such as Kant, Husserl, Simondon, Derrida, Adorno, and Horkheimer. His analysis culminates in a social critique of what he describes as the industrialization of imagination (Stiegler 2011, 82) in the contemporary era, wherein the imagination becomes a product and tool of industrial processes.²

The paper is structured in two main parts. In the first part, I will briefly examine how Stiegler both draws upon and moves beyond Kant and Husserl in his treatment of memory and imagination. I will introduce Stiegler's conception of technics as the «exteriorization of memory» (Stiegler 1998, 173) and demonstrate how his critique of Husserl's notion of memory leads to the development of the concept of «tertiary retention» (Stiegler 2011, 18), which shapes both primary and secondary retentions. Furthermore, I will highlight that, despite Stiegler's critique, Husserl's concepts of time-consciousness, phantasy, and fiction remain pivotal to Stiegler's social critique of the industrialized imagination, a topic that will be elaborated in the second part of the paper. The reconstruction of Stiegler's treatment of imagination will then identify three key moments: (a) imagination in relation to memory-enabling devices; (b) imagination in the generation of knowledge and sense-making; and (c) imagination as shaped by phantasy objects and technical reproduction.

In the second part, I will investigate Stiegler's interpretation of consciousness as having a cinematic structure, as well as his conceptualization of imagination as embedded within the cultural industry, which enables him to articulate his theory of the industrialization of imagination (Stiegler 2011, 82). It will become evident that, for Stiegler, if technical objects and media serve as supports for memory and imagination, then imagination is not merely an internal, autonomous faculty, but is fundamentally shaped through the interaction between the subject and their milieu, along with its associated power relations. Thus, technology, in Stiegler's framework, functions as a *pharmakon* – both remedy and poison – of memory and imagination. Stiegler's sustained interest for the imagination justifies the claim toward a *politics of the technologized imagination*. Ultimately, I will argue that Stiegler's notion of exteriorized imagination offers a critical framework for theorizing how the human subject is co-constituted with technical prostheses in the context of high-technology societies, making it a vital tool for social critique in the digital age.

1. Stiegler on technics, memory, and imagination

As a philosopher of technology, Stiegler's reflections on the imagination are contextualized in his larger conception of technics. In this perspective, the imagination works in tight connection with memory-enabling devices. To gain a deeper understanding, I will first present briefly Stiegler's philosophical anthropology as an anthropotechnics (elaborated in the

² Stiegler alternates between the terms “technology” and “technics” (in French *technologie* and *technique*), without always drawing a clear distinction. This oscillation can be understood as reflecting a continuity between technics and technology when viewed through the lens of exteriorization. This article employs the terms with an overlapping spirit, drawing on their semantic and conceptual connections within Stiegler's philosophy. While emphasizing their continuities as forms of exteriorization, the article also associates “technology” mainly with the technics of the industrial era—objects and processes reliant on advanced scientific abstraction and industrial organization, such as mass media and digital platforms. In contrast, “technics” is treated as a broader term encompassing technical practices in general, tied to the logic of inorganic supplements through which human life constitutes itself over time. Readers should remain mindful of this semantic ambivalence throughout the text. See also the translators' note in Stiegler (1998, 280).

first volume of *Technics and Time*), and then focus on his problematization of the imagination (mostly with reference to *Technics and Time III*).

1.1. The human as a prosthetic animal

In *Technics and Time I*, Stiegler deals with the question of technics as a general feature of human life. The origin of the human is not to be found in a biological or transcendental essence, but in a dynamic relationship between living and non-living matter. Following paleo-anthropologist André Leroi-Gourhan, such a relationship is what Stiegler calls «exteriorization»: namely, a process in which the interiority of human beings becomes inscribed and co-dependent with the exteriority of tools and artifacts (Stiegler 1998, 141-142). Leroi-Gourhan's prehistoric studies reveal technics as a transhistorical phenomenon, leading Stiegler to claim that human history is fundamentally a history of exteriorization (see Johnson 2013).

Technics works as an extension of human presence in the world. In this sense, tools are «protheses» which allow human beings to act, and «technics is the pursuit of life by means other than life» (Stiegler 1998, 17). As a being always in a dynamic relation with a milieu, the human being finds through technics the fundamental domain pointing to the relation between the organic and the inorganic. In other words, human life is always co-constituted with its “dead” technical supplements, or with «organized inorganic matter» (Stiegler 1998, 49). At the same time as humans invent technical extensions, however, technicity invents the human in turn, such that technicity is not reduced to an anthropocentric extension. Anthro-po-genesis is thus coextensive with techno-genesis. Technical protheses are no mere support, but rather extensions that can be both enabling and disabling. Following Derrida's characterization of writing as a pharmakon of memory, Stiegler considers technology in general as a “pharmakon” – namely, as both *remedy* and *poison*.

Stiegler further illustrates this anthropotechnical position with a reading of the myth of Prometheus and Epimetheus.³ In the myth, Epimetheus creates animals but forgets to bestow humans with any natural advantage. To rectify this, Prometheus steals fire for humanity. While traditional interpretations focus on Prometheus's gift of fire as a symbol of technics, Stiegler emphasizes Epimetheus's initial forgetfulness (Stiegler 1998, 185). For Stiegler, the human is fundamentally a forgetful animal, whose existence is perpetually redefined through the interplay of interiority and exteriority. This relationship underscores the intimate connection between technical exteriorization (as humanity's ontological condition in space) and time (where memory is supplemented by objects, granting permanence to expression).

Through the traces humans leave in objects, artifacts, and environments, these technical elements become cultural objects. At the same time, humans experience their past through technical objects inscribed with memory, allowing them to project themselves into the future. In this sense, technical prosthetics play a crucial role not only in human existence but in shaping the experience of time itself.

³ While the term “anthropotechnics” is more commonly associated with Sloterdijk (2014), the concept is implicit in Stiegler's theory. This notion aligns with Stiegler's vision of the human as historically constituted through the dynamic interplay between the “bio-anthropological” and “techno-logical” dimensions (Stiegler 2009, 7). Although Stiegler's philosophy extends beyond an anthropology of technics, it undeniably incorporates a significant anthropological dimension, in acknowledging the significant role of technics in shaping the human. These ideas, however, are developed more in dialogue with Leroi-Gourhan rather than Sloterdijk. For a discussion of Stiegler's and Sloterdijk's philosophies as anthropotechnical perspectives, see Lemmens and Hui (2017).

1.2. Technics and memory

The nexus between technology, memory, and imagination has been a central theme throughout Stiegler's work, as evidenced by his first published text, *Technologies de la mémoire et de l'imagination* (Stiegler 1986), which laid the foundation for his exploration of these concepts in the *Technics and Time* series. Stiegler's anthropotechnical definition of the human as a forgetful animal serves to contextualize his interest in memory and imagination.

For Stiegler, technics, conceived as exteriorization, is memory. In *Technics and Time III*, Stiegler develops the crucial idea of technics as memory through a critical appropriation of Husserl's notion of time-consciousness [*Zeitbewusstsein*] (Stiegler 2011, 13). Husserl's concept of time-consciousness holds that every perceptual experience is temporal. In the life of consciousness, each moment is a succession of lived experiences [*Erlebnis*] interconnected within a horizon of sense. Every present experience becomes past as soon as it is lived, and some experiences make sense only in connection with the previous moments that precede it. Husserl gives the famous example of the melody as a coherent succession of events that can be grasped only in virtue of the previous instants that compose it. When a single instant of a melody is considered in isolation, it appears merely as a musical note, not as a melody. The phenomenality of the melody lies in its flow, and as such, melodies are purely temporal phenomena.

Husserl holds that the structure of consciousness itself is temporal. Every living experience happens in time and becomes «registered» in consciousness through «retention», which is the basis for memory, and point to a future through «protention», the basis for future anticipation. Importantly, in his 1905 lectures *On the Phenomenology of the Consciousness of Internal Time*, Husserl distinguished between «primary and secondary memory» [«primäre Erinnerung und sekundäre Erinnerung»] (Husserl 1991, 47), which Stiegler calls «primary and secondary retention» (Stiegler 2011, 21). The primary one is an operation of inscription of the contents of lived experience as they happen in the present through perception (involving merely a modification of a “now” into a “no-longer now”). On the other hand, secondary memory refers to a mode of reproduction of those contents inscribed in primary retention (recollection, remembering).

Stiegler discusses the distinction between primary and secondary retention, arguing that they should be distinguished but not opposed. By taking up Husserl's example of the melody as a purely temporal object, Stiegler notes that sound recording devices allows for the identical repetition of a given temporal object. However, when listening to a melody a second or third time, the new experiences captured in primary retention are never exactly identical. Primary retention always retains a partial amount of experience and never its totality; indicating that memorizing implies forgetting, as a figure emerging from a ground. This «retentional finitude» is the «grounding condition of consciousness-as-temporal-flux» (Stiegler 2011, 20). What occurs is a selection of retained experiences; then, according to Stiegler, the secondary retention in-forms new primary retention according to selection criteria: «a reduction of what passes by to a past that retains only what the criteria constituting the secondary retentions allow it to select: secondary retentions inhabit the process of primary retention in advance» (Stiegler 2011, 19).

However, these selections are themselves informed by previous criteria of selection. Here Stiegler introduces the key concept of «*tertiary retentions*» to account for the role of technics in memory. Melodies are reproduced insofar as there are technologies of reproduction, which substantiate memory (secondary retention) and allow for new perceptive experiences via repetition (primary retentions). If a single temporal object corresponds to two or more sets of primary retentions, then these retentions must be shaped by something preceding them – that is, for Stiegler, both secondary memory, tertiary memory, and

their associated protentions. In other words, this technical, tertiary form of memory creates an imprint that is fundamentally prior to our primary retentions; it is through this process that we temporalize ourselves and the world around us.

What are tertiary retentions? As a tertiary retention, technics is memory. Because technics refers to inorganic matter, tertiary retentions are forms of objective memory: «we must mark as tertiary retentions all forms of “objective” memory: cinematogram, photograph, phonogram, writing, paintings, sculptures – but also monuments and objects in general, since they bear witness, for me, say, of a past that I enforcedly did not myself live» (Stiegler 2011, 28). We may identify two classes of artifacts as agents of technical memory. Some artifacts actively record experiences and engender their reproduction according to the automatic functions of machines (e.g. recording devices), while others simply embody human traces in their materiality.

In general, however, the concept of tertiary retention indicates an “objective” memory. In other words, technics as a tertiary retention indicates an exo-somatic, artificial memory interrelating with biological memory. The exteriorization of memory through tools represents a third kind of memory distinct from the internal, individually acquired memory of our brain (epigenetic) and the biological, evolutionary memory inherited from our ancestors (phylogenetic). Stiegler refers to this as «*epiphylogenetic memory*» (Stiegler 1998, 177).⁴ Far from indicating that objects have or experience memory akin to vital beings, the notion of tertiary retention highlights the centrality of the object-side in the constitution of memory. If for Husserl the focus is on the noetic side of the *noesis-noema* correlation, namely on the conscious intentional act, Stiegler broadens the scope to centralize the relation between subject and technical milieu.

In this sense, technics plays a fundamental role in culture, and it decisively informs temporality, both by shaping our sense of time directly through the effects on personal and collective memory, but also by connecting us with a temporal dimension that is broader than our own personal lives. In its most general sense, a tertiary retention is «the prosthesis of consciousness without which there could be no mind, no recall, no memory of a past that one has not personally lived, no culture» (Stiegler 2011, 39). In Stiegler's account, technical objects provide the fundamental platform for the transmission of culture over time, connecting us with the past, and projecting us toward the future.

Before moving to the nexus technics-memory-imagination, however, we should note that the technical prosthesis is also a *pharmakon*. On this basis, Stiegler develops the notion of «pharmacology», as a philosophical methodology that does not only consider the ambiguous character of technology but is also a way for critically assessing the ethical-political content of the relation between human organs and technical organs (Stiegler 2013). In turn, the later concept of a «positive pharmacology» (Stiegler 2021, 367) takes on a more active and constructive dimension, whereby societies are called to take up the challenge of re-defining and re-designing technology to foster the development of collective intelligence against generalized commodification.

Hence, as pharmacological entities and tertiary retentions, technical objects also stimulate a degree of ignorance and forgetfulness on the human side. When prosthetic devices take over certain tasks – whether manual or related to memory – humans are gradually relieved of these functions. In this sense, technical automatization raises important

⁴ As Yuk Hui noted, Stiegler occasionally changed the wording to refer to the third type of memory, but ultimately maintaining the same idea: «Epiphylogenetic memories constitute the prosthesis of individual and collective memory [...] In the past thirty years Stiegler has from time to time changed his formulation of these terms from tertiary retention to epiphylogenesis, and more recently to exosomatization, as responses to specific questions, yet all of these terms concern the same subject – namely, technics as “the pursuit of life by means other than life”» (Hui 2019, 218).

questions about knowledge (*le savoir*), as we will explore. Simultaneously, technical-cultural forms shape not only what we remember from the past but also what we anticipate and project into the future, as retention is always connected to protention. In other words, as *pharmaka* of memory, technical devices filter both the protentive structure of consciousness and the schematizing process of the imagination. This is central to the intimate link between technics, memory, and imagination in Stiegler's thought, which we will now examine.

1.3. From memory to imagination

Understanding technics as prosthesis implies that not only bodily organs, but also mental faculties have their own prostheses. The third volume of *Technics and Time* deals extensively with the prosthetization of the imagination, and Kant's schematism is the point of departure. In Kant's *Transcendental Doctrine of Judgment* in the *Critique of Pure Reason*, the concept of "schematism" refers to the process by which the imagination mediates between the pure concepts of the understanding (the categories) and the sensory data of intuition. This mediation is essential for the application of these abstract concepts to our sensory experiences, thus enabling knowledge and guaranteeing the unity of consciousness.

The imagination generates these schemata through its ability to produce images or representations, ultimately allowing for sense-making. In this process of sense-making, the imagination has then a crucial function and serves to orient the subject's interpretation of the world. In analogy with memory, Stiegler argues that imaginative acts rely on technical prostheses too – books, films, media, and artifacts in general (Stiegler 2011, 58). On one hand, Stiegler's critique of Husserl establishes the role of technics as memory, while the discussion of Kant bridges the schematic function of the imagination with its technical mediations.

The concept of technical memory (tertiary retention) is central to Stiegler's development of the technicized imagination. This becomes evident when contrasted with another theorist of the technical imagination, Don Ihde. As Wellner (2022a, 196) noted, Ihde primarily explored imagination in relation to technics and perception, focusing on everyday and scientific technologies, whereas Stiegler's reflection centres on memory and communication technologies. While both thinkers address the role of technology in shaping human experience, Stiegler's focus on memory reveals a deeper engagement with the question of time, namely how external devices mediate experience and knowledge across time.

What is the relationship between technics-as-memory and imagination, then? Despite being deeply interlinked, memory and imagination are not synonymous in Stiegler's thought. On one hand, the imagination is a condition to technics as memory. Exteriorization into cultural objects relies on an imaginative and inventive act of gesture and speech. Further, the social direction of exteriorization is often oriented by imaginaries: accordingly, human consciousness is «constituted by the co-evolution of its dreams and its technics» (Stiegler 2014, 33). On the other, the very working of the imagination relies on an already existing milieu with its own tertiary retentions. Technical objects and recording devices constitute a materially sedimented cultural reservoir that informs the imagination and its capacity for schematizations. Thus, imagination and memory (in its technical form) are co-dependent and mutually influence one another.

At the same time, this co-dependence is not without problems. If the imagination is dependent on technology, then given technical forms of life will condition its schematics – sometimes even destroying its potential, according to Stiegler. The question of judgment is central in Stiegler's thought, and his interest in the schematic power of the imagination signals precisely this concern for judgment, which is at once philosophical and political. For example, Turner (2023) explores how the imagination plays a vital role in Stiegler's politics

of judgment, whereby profit-driven algorithmic mediation works against the critical knowledge of the thinking subject. As technologies of profit and control, digital media operate an attack on attention and imagination, constraining the “critical labour” of judgment and ultimately implying the de-skilling of the capacity of judgment.

Stiegler dedicates substantial reflection to the weakening of critical judgment and develops it further in later works, both through the critique of what he (following Simondon) calls «proletarianization», and by discussing how automatization contributes to losing certain forms of knowledge (see Stiegler 2013, 2018).⁵ For our purposes, it is sufficient to note here that the technologized imagination is indeed implicated in these epistemic and political processes around knowledge.⁶ As a matter of knowledge production and transmission, these considerations also have implications for the thinking and practice of education in relation to digital media (Lindberg 2020; Bradley & Kennedy 2019).

However, there is another element of the imagination that Stiegler considers as central, namely phantasy. The salience of a pharmacology of the imagination lies in the future-oriented character of the imagination, defining anticipations and expectations toward the future. Hence the stakes around technics and imagination concern the possibility of the future, and the kind of future that human societies move toward. In this context, when it comes to defining imaginative possibilities, Stiegler discusses another relevant aspect of the imagination, which is its function to deal with phantasy objects.

1.4. Imagination and phantasy

Stiegler's concern for the imagination, in connection with technology, includes both its schematic function in the generation of knowledge and critical thinking, as well as the question of phantasy and fiction. *Technics and Time III* takes up precisely this question of orientation for thought in our techno-scientific age where the line between fiction and reality becomes often blurred due to technical reproduction (Stiegler 2011, 6).

Stiegler discusses the opposition between phantasy or imagination, and perception, in reference to Husserl's reflections on the topic. For our purposes, it suffices to say that Husserl distinguished between perception as a form of presentation, and imagination as mode of presentification. «Presentation» [*Gegenwärtigung*] presents something actual and present, while «presentification» [*Vergegenwärtigung*] presents something absent *as if* it were present (Husserl 2005). Presentifications include both memory and imagination. Husserl distinguished between at least two forms of imagination, that is, «image-consciousness» [*Bildbewusstsein*] and «as-if consciousness» [*Als-ob Bewusstsein*]. The first involves a kind of perception, specifically of an image on a physical supplement which is then related with an external image subject; while the second refers to a mode of engaging with objects of experience that neutralizes belief in their actual existence, e.g., as in “pure phantasy”, and it includes experiences such as daydream or art forms like theatre (see Carreño Cobos 2013; Cavallaro 2017; Alves 2019).

Hence the imagination – whether conceived as “image-consciousness” or as a broader form of “as-if consciousness” – is distinguished from the domain of “actuality” to which

⁵ «Systemic stupidity is engendered by *generalized proletarianization*, from which there is no escape for any actor within the consumerist industrial system, proletarianization resulting precisely from a pharmacological development, where the *pharmakon* short-circuits those whom it inscribes in the circuit of production, consumption and speculation, and does so by destroying *investment*, that is, *the desiring projection of imagination*» (Stiegler 2013, 22).

⁶ In this respect, Stiegler affirms that contemporary big data contribute to «*liquidate all forms of knowledge (savoir vivre, savoir faire and savoir conceptualiser, knowledge of how to live, do and think*» (Stiegler 2018, 51).

perception gives access.⁷ Both memory and imagination are forms of presentification because they allow for absent objects to be taken as present. In this perspective, the crucial difference between (reproductive) imagination and memory is that in memory what appears as absent indicates a really existing past, while imagination indicates a non-actual, possible state of affairs. Stiegler attributes to Husserl's account a separation between imagination as a mode of engagement with non-actual objects of phantasy, and perception and memory as granting access to actual reality (Stiegler 2011, 38).⁸ The question of the actual or non-actual status of imaginary forms is very relevant for Stiegler, especially in relation to technical reproduction and the corresponding saturation of the conscious life of subjects (including memory and imagination) with fictional objects. The effectivity of fictions to guide the imaginative and protentive power of subjects disallows a strict separation between actual perception and non-actual imagination. In order to deal with this question, Stiegler moves to the discussion of cinema.

2. Cinematic consciousness and the industrialization of the imagination

2.1. The question of cinema: on cinematic consciousness

Through the notion of tertiary retention, Stiegler attributes a material dimension to Husserl's concept of time-consciousness, considering it as a system defined in relation with the technical milieu. If consciousness is time, and consciousness is «the general system of tertiary retentions» (Stiegler 2011, 54-55), then time consciousness itself will be conditioned by exteriorization devices. In this context, *cinema is the emblematic form to understand consciousness as temporality and as system of tertiary retention*. If the melody shows consciousness to be a temporal flux, cinema complements the flux with images.

Stiegler explains the highly attractive power of cinema through the provocative hypothesis that consciousness itself has a cinematographic structure: «A film [...] is essentially a flux: it consists of its unity in and as flow. The temporal object, as flux, coincides with the stream of consciousness of which it is the object: the spectator's» (Stiegler 2011, 12). When immersed in a cinematic experience, the spectator's attention is immersed in the cinematic flux because consciousness is itself an audio-visual flux. In this account, consciousness is inherently cinematic, it is a cinematic consciousness.

In relation with the imagination, cinema occupies a special place because «its technics of image and sound [...] re-invent our belief in stories that are now told with remarkable, unparalleled power» (Stiegler 2011, 9). As a system of audio-visual flux, cinema is both a tertiary retention and a vehicle of imagination. We may thus call it an *objective imagination*, in parallel to *objective memory*. Without providing a clear-cut definition of imagination, when it comes to cinema, Stiegler treats it as the ability to produce images and to re-assemble them, such that «there can be no mental image without an objective image» (Stiegler 2011, 53).

This form of objective imagination, as derived from the Stieglerian perspective, does not necessarily imply a machinic imagination. The question here is not about whether machines can imagine, as it has been recently discussed in some instances regarding imaginative AI

⁷ In Husserl's words: «[c]onsciousness of what is not present belongs to the essence of phantasy» (2005, 63).

⁸ Stiegler's interpretation appears to align more closely with those emphasizing the primacy of perception in Husserl's phenomenology as a foundational model for other modes (e.g., Drost 1990). However, some scholars have challenged this view, arguing instead that imagination plays a pivotal role in shaping the understanding of reality in Husserl's account (see Dufourcq 2011).

(Wellner 2022b; Liberati 2022). Rather, Stiegler's point allows to define the imagination in terms of a structural interplay with technical supplements, exemplified in this case by cinema as a paradigmatic form. A more compatible position can be identified in the concept of «tertiary protention» (Hui 2016, 221), which brings Stiegler's idea of «tertiary retention» to the level of the imagination, partly attributing predictive functions of the imagination to digital algorithms, while simultaneously remaining centred on the feedback cycle between human projection and digital anticipations. Algorithmic mediation in digital reality leads to a condition characterized by the interplay between tertiary retentions and tertiary protentions, where the contents of experience are not merely stored in externalized reservoirs but are pre-emptively collected and processed. Nony (2024) describes this mediatic situation as a new stage in the proletarianization of the mind, where artificial intelligence processes extracted data to re-modulate user behaviour according to inaccessible norms.

Thus, consistently with the individual-milieu correlation (Simondon), and the conception of hominization through exteriorization (Leroi-Gourhan), Stiegler argues for a conception of the imagination in connection with the material and cultural reality of exteriorizations. The concept of cinematic consciousness as an objective imagination serves as a theoretical foundation to analyse the specific forms in which the technologized imagination plays out in different contexts of socio-technical life. The coincidence between consciousness and the cinematic audio-visual flux leads to the question of how fictions can increasingly in-form the imaginative structure of subjects and their movement toward the future, in conditions of intense technical reproduction. If technical objects and media function as supports for memory and imagination, then the imagination is not merely an internal, unconstrained, and individual faculty, but it is decisively formed in the interplay between subject and milieu with its associated power relations.

2.2. Industrialization of imagination

Stiegler's concept of cinematic consciousness as an audio-visual temporal flux which is co-constituted with the socio-technical milieu, with its system of retentions operating selections and influencing the protentional possibilities of the subject, implies an important political dimension in relation to the culture industry. Cinema is not simply consciousness that refers back to itself through audio-visual exteriorization. Cinema is the apex of an industrial system of culture. In other words, cinema coincides with the *becoming industrial* of imagination. Dominant cinematic forms produce fictions and stories that shape the self-understanding of spectators. As a global industry, cinema produces global temporal objects that become global retentions and, consequently, global protentions. Cinema constitutes a key moment in the history of imagination because it is when the imagination becomes an object of industry, alongside the industrialization of memory (Roberts 2006).

In relation to this matter, Stiegler discusses Adorno and Horkheimer's critique of the culture industry. In the *Dialectic of Enlightenment*, they maintain that «[t]he active contribution which Kantian schematism still expected of subjects [...] is denied to the subject by industry. It purveys schematism as its first service to the customer» (Adorno & Horkheimer 2002, 38). In addition, for the Frankfurt theorists, the culture industry is a form of control in which it is increasingly difficult to distinguish real life from film. In essence, what they denounce is the automation of the imagination as a process that favours capitalist reproduction. Differently from the Frankfurt theorists, Stiegler does not consider technical mediation as being itself the problem because of the intimate, co-constitutive relation between the imagination and tertiary retentions: «if there is an "industrial schematism", it is because the schematics are originarily, in their very structure, industrializable: they are

functions of tertiary retention; that is, of technics» (Stiegler 2011, 41).⁹ In other words, the novelty of technical industrialization is possible on the premises of a deeper continuity grounded on technical exteriorization itself.

Stiegler's technical conception of the schematism ties with fiction and phantasy. Stiegler contends that Husserl, Adorno, and Horkheimer share a common «obsession» with separating perception from imagination, reality from fiction – because without this separation, there would be only mental disorder (Stiegler 2011, 38). Stiegler argues that this distinction must not be seen as an opposition, once we affirm that technical reproducibility (as a site of objective memory and audio-visual production) shapes and filters perception. Once Stiegler conceives of imagination as conditioned by the retentions and protentions, including objective memory as sediments of imaginative supplements, the salient point becomes that fiction is not merely in-actual but somehow actualizes itself in reality by conditioning the imaginative possibilities of human subjects. Bergson's concept of virtuality fits well here, as that which mediates between the potential and the actual. In other words, the intensification of technical reproduction renders the concept of purely non-actual fictions untenable. The saturation of the contemporary technical milieu with reproducible content – even more now today with social media, videogames, and all sorts of entertainment platforms – rather calls the critical theorist to the task of questioning how the regime of production and distribution of fictions shapes the collective imagination and its potential to imagine future possibilities.

The industrialization of the imagination not only shapes the content of imaginative objects but also the imaginative process itself. This form of industrial monopoly leads to pathologies of the imagination. One aspect is the *standardization* of consumer-citizens: industrial control of the imagination leads to «the confusion of all possible I's in an undifferentiated flux [...] [which] is condemned to dissolve into a globalized, impersonal *One*» (Stiegler 2011, 4). Without appropriate critical-schematic functions, there occurs «the cancellation of the possibility of exceptions» (Stiegler 2011, 103). Another important aspect is the exclusion from the means of imagination-production. Drawing from Simondon's account of the industrial worker in the automated factory, Stiegler notes a parallel de-skilling and exclusion in relation to the imagination: «just as the worker has been deprived of individual technical potential by machine tools, the subject-conscious-of-objects has become a consumer-of-products deprived of all possibilities of participating in the process of defining, constructing, and implementing the retentional criteria for a life of the mind» (Stiegler 2011, 103).

These two aspects – standardization and exclusion – can be detected in contemporary mediatic forms. Although digital media offers an enlargement of cultural expression, the unequal social structure and profit-driven design result in an oversaturation of content within a competitive environment. The catchiest and quickest-to-consume products dominate attention, marginalizing alternative forms of expression and thinking. The audio-visual flux is accelerated on contemporary streaming platforms and social media, reshaping both the temporality of consumption and the modes of appearance of the flux. This analysis supports a critique of the attention economy (Stiegler 2018), which contends that an emphasis on instant gratification undermines judgment, memory, and imagination. De Preester (2021) builds on Stiegler's critique, demonstrating that the commodification of attention affects not only the capacity to concentrate but also care and desire themselves.

In considering new forms of cultural expression with AI, we might view ChatGPT as a mode of cultural production that privileges specific standards of expression – such as

⁹ For a broader discussion of the relation between Stiegler's philosophy of technics and the Frankfurt School critique of instrumental reason, especially Adorno, Horkheimer, and Habermas, see Stiegler (1986), and Van Camp (2009).

clarity, logical structure, and the avoidance of potentially offensive language. This contributes to an infosphere of standardized cultural expression in which the imaginative subject is immersed. The standardization of cultural products, critiqued by theorists of the culture industry, including Stiegler, can be applied to generative AI technologies. Despite their vast databases and recombinatory capabilities, these systems are inherently biased toward the statistically most probable reply within a given informational milieu. Thus, they appear more inclined to reflect prevailing patterns of thought and sentiment than to serve as genuinely imaginative technologies or sources of novelty (although this does not preclude their possible role in assisting the imaginative subject in creating texts or envisioning new possibilities).

These considerations point to an intrinsic connection between technology, imagination, and desire. The industrialization of cultural products allows for the shaping and modulation of desires in a way that informs imaginative possibilities. The ultimate political problem, according to Stiegler, is the destructive effect on desire. As cinematic consciousness, the flux of the *I* is constituted by a past (retention) that always points to a future (protention). The possibility of projection is constitutive of the present and orients aspirations both individual and collective (Stiegler 2011, 76). It is on this basis that consciousness projects itself into a possible future. The automation of the imagination corresponds to an automation of the protentional possibilities of desire. Contemporary industrialized media trap human desire into presentist modalities by treating it as a commodity. Because this situation mortifies desire, the very possibility to truly desire a future is at risk: «all human social grouping [...] is above all the sharing and projection, through the group itself, of a desire for a common future» (Stiegler 2011, 88). Therefore, it appears evident that the question of desirable futures in alternative to global techno-economic destructivity must remain open, and that this question involves directly the imagination.

Conclusion

This paper attempted to reconstruct Stiegler's conception of the imagination as constitutively related to technical media, alongside three main dimensions: (a) imagination in relation to memory-enabling devices; (b) imagination in the generation of knowledge and sense-making; and (c) imagination as shaped by phantasy objects and technical reproduction. We have seen that the idea of imagination implied in the concept of cinematic consciousness draws from Kant's transcendental schematism, Husserl's notion of time-consciousness, as well as his reflections on phantasy. We mentioned that the schematism connects the data of our experience with our understanding, but this connection is crucially dependent on the constitution of consciousness in its socio-technical milieu. Further, the idea of cinema as a form of imagination not only is a paradigm for understanding imagination in its technical and socio-economic constitution, but it also brings to the fore the problem of how fictions shape our understanding of reality. Fictional objects, in Stiegler's analysis, are not simply abstract objects of phantasy with no grip on any actual reality, but rather, especially within a culture industry, fictions form the concrete imaginary that shape real future possibilities.

The reconstruction of Stiegler's treatment of imagination enables a reading of this concept in continuity not only with phenomenological perspectives (e.g., Husserl, Merleau-Ponty), but also with other philosophers and social theorists who recognized the value of the imagination in processes of social transformation. These include Ricœur, who explored its ideological and transformative power; Castoriadis, who highlighted its instituting function; Anderson, who focused on its role in fostering group belonging; and thinkers like Bloch, Lefebvre, and Marcuse, who saw the imagination as an opening toward future forms

of alternative social organization. While any comprehensive comparison lies beyond the scope of this paper, Stiegler's reflections on imagination resonate particularly with Marcuse's, especially regarding the relationship between imagination and technology. The politicization of the technologized imagination was already central to Marcuse's critical theory, who recognized a crucial relation between the imagination as a faculty of social transformation and its technological mediation in advanced industrial societies (Marcuse 1968), thus locating the theoretical and practical interest in the material, technical, and social production of imaginative forms.

This paper analysed the concept of imagination and demonstrated its role as a basis for Stiegler's political critique of the contemporary techno-economic system, with its detrimental effects on imagination and in shrinking the possibilities for social change. The analysis traced the development of a pharmacology of the imagination, primarily through Stiegler's trajectory from his early essay *Technologies de la mémoire et de l'imagination* to the *Technics and Time* series, up to the works on pharmacology, e.g., *What Makes Life Worth Living. On Pharmacology*. While it could be argued that the pharmacology of the imagination remains central to Stiegler's later work, particularly in relation to what Daniel Ross has termed the «neganthropological» phase (Stiegler 2018, 22), a full exploration of this theme lies beyond the scope of this paper.¹⁰

In conclusion, Stiegler's notion of exteriorized imagination provides a framework for theorizing how the human subject is co-constituted in the mediation with technical prostheses. By identifying cinema as the locus of the industrialization of imagination, Stiegler offers valuable theoretical tools for analysing contemporary technological realities. The conception of imagination as a partly technological faculty also invites critical reflections on current digital realities and advancements in artificial intelligence (Romele 2020; Wellner 2022a). Stiegler's pharmacology of the imagination considers both the pathologies and possibilities inherent in its relationship with technology. In this way, it complexifies Adorno and Horkheimer's critique of the culture industry by showing how technological media inherently function as co-constitutive forces that both enable and constrain memory and imagination. Ultimately, Stiegler's approach positions imagination as a transformative political faculty, historically embedded in socio-technical milieus. From this perspective, imagination not only reflects but actively shapes the desires and future orientations of subjects. However, this transformative power is always co-dependent on the *pharmaka* – the technological supports – that either foster or inhibit its development.

Bibliography

Adorno, T. & Horkheimer, M. (2002). *Dialectic of Enlightenment: Philosophical Fragments*. Engl. Trans. E. Jephcott, Stanford University Press.

Alves, P. (2019). Phenomenology of Fantasy and Fiction: Some Remarks Towards a Unified Account. *Phainomenon*, 29, 39-55 (<http://dx.doi.org/10.2478/phainomenon-2019-0003>).

Bradley, J. P. N. & Kennedy, D. (2019). Stiegler as philosopher of education. *Educational Philosophy and Theory*, 52 (4), 332-336 (<https://doi.org/10.1080/00131857.2019.1676728>).

¹⁰ See Ross' introduction to Stiegler's *The Neganthropocene* (Stiegler 2018), which divides Stiegler's work into three phases: «technological», «organological-pharmacological», and «neganthropological». See also Gilmozzi (2023) for a discussion of this tripartition, and Crogan (2010) for an analysis of the relation between Stiegler's *Technics and Time* and the activism of his later writings.

- Carreño Cobos, J. E. (2013). The Many Senses of Imagination and the Manifestation of Fiction: A View from Husserl's Phenomenology of Phantasy. *Husserl Studies*, 29 (2), 143-162 (<https://doi.org/10.1007/s10743-012-9117-2>).
- Cavallaro, M. (2017). The Phenomenon of Ego-Splitting in Husserl's Phenomenology of Pure Phantasy. *Journal of the British Society for Phenomenology*, 48 (2), 162-177 (<https://doi.org/10.1080/00071773.2016.1250436>).
- Croghan, P. (2010). Bernard Stiegler: Philosophy, Technics, and Activism. *Cultural Politics*, 6 (2), 133-156 (<https://doi.org/10.2752/175174310X12672016548162>).
- De Preester H. (2021). Life Is What You Fill Your Attention With – The War for Attention and the Role of Digital Technology in the Work of Bernard Stiegler. *Phenomenology and Mind* 20, 102-116 (<https://doi.org/10.17454/10.17454/pam-2010>).
- Drost, M. P. (1990). The Primacy of Perception in Husserl's Theory of Imagining. *Philosophy and Phenomenological Research*, 50 (3), 569-582 (<https://doi.org/10.2307/2108165>).
- Dufourcq, A. (2011). *La dimension imaginaire du réel dans la philosophie de Husserl*. Dordrecht, Heidelberg, London, New York: Springer.
- Gilmozzi, G. (2023). Tecno-logia, farmacologia e negantropologia. Note introduttive al pensiero di Bernard Stiegler. *Lo Sguardo - rivista di filosofia*. 36 (1), 353-371 (<https://doi.org/10.5281/zenodo.11125139>).
- Hui, Y. (2016). *On the Existence of Digital Objects*. Minneapolis: University of Minnesota Press.
- Hui, Y. (2019). *Recursivity and Contingency*. Lanham, MD: Rowman & Littlefield International.
- Husserl, E. (1991). *On the Phenomenology of the Consciousness of Internal Time (1893–1917) (Husserliana Collected Works 10)*. Eng. Trans. J. B. Brough. Dordrecht: Springer.
- Husserl, E. (2005). *Phantasy, Image Consciousness and Memory (Husserliana Collected Works 11)*. Engl. Trans. J. B. Brough. Dordrecht. Springer.
- Johnson, C. (2013). The Prehistory of Technology: On the Contribution of Leroi-Gourhan. In Ch. Howells & G. Moore (eds). *Stiegler and Technics* (34-52). Edinburgh: Edinburgh University Press.
- Lemmens, P., & Hui, Y. (2017). Reframing the Technosphere: Peter Sloterdijk and Bernard Stiegler's Anthropotechnological Diagnoses of the Anthropocene. *Krisis. Journal for Contemporary Philosophy*, 37 (2), 26-41. (<https://krisis.eu/article/view/38844>).
- Liberati, N. (2022). Reflections on an Externalized Digital Imagination. *Foundations of Science*, 27 (2), 407-410 (<https://doi.org/10.1007/s10699-020-09768-9>).
- Lindberg, S. (2020). Politics of Digital Learning—Thinking Education with Bernard Stiegler. *Educational Philosophy and Theory*, 52 (4), 384-396 (<https://doi.org/10.1080/00131857.2019.1586531>).
- Marcuse, H. (1968). Philosophy and Critical Theory. In *Negations: Essays in Critical Theory*. Engl. Trans. J. Shapiro (134-157). Boston: Beacon Press.
- Nony, A. (2024). Proletarianization of the Mind: A Media Theory of Artificial Intelligence after Simondon and Stiegler. *Trópos. Revista di Ermeneutica e Critica Filosofica*, 16 (1), 116-136 (<https://doi.org/10.13135/2036-542X/11056>).
- Roberts, B. (2006). Cinema as Mnemotechnics: Bernard Stiegler and the "Industrialization of Memory". *Angelaki*, 11 (1), 55-63 (<https://doi.org/10.1080/09697250600797864>).
- Romele, A. (2020). *Digital Hermeneutics: Philosophical Investigations in New Media and Technologies*. New York and London: Routledge.
- Sloterdijk, P. (2014). *You Must Change Your Life. On Anthropotechnics*. Engl. Trans. W. Hoban. Cambridge-Malden: Polity.
- Stiegler, B. (1986). Technologies de la mémoire et de l'imagination. *Réseaux*, 4 (16), 61-87.

- Stiegler, B. (1998) *Technics and Time, Vol. I: The Fault of Epimetheus*. Engl. Trans. R. Beardsworth & G. Collins. Redwood City, CA: Stanford University Press.
- Stiegler, B. (2009). *Technics and Time, Vol. II: Disorientation*. Engl. Trans. S. F. Barker. Redwood City, CA: Stanford University Press.
- Stiegler, B. (2011). *Technics and time, Vol. III: Cinematic Time and the Question of Malaise*. Engl. Trans. S. F. Barker. Redwood City, CA: Stanford University Press.
- Stiegler, B. (2013). *What Makes Life Worth Living: On Pharmacology*. Engl. Trans. D. Ross. Cambridge: Polity Press.
- Stiegler, B. (2014). Organology of Dreams and Archi-Cinema. *The Nordic Journal of Aesthetics*, 47, 7-37 (<https://doi.org/10.7146/nja.v24i47.23053>).
- Stiegler, B. (2018). *The Neganthropocene*. Engl. Trans. D. Ross. London: Open Humanities Press.
- Stiegler, B. (2021). Afterword: On Positive Pharmacology. In D. Ross. *Psychopolitical Anaphylaxis: Steps towards a Metacosmics* (357-368). London: Open Humanities Press.
- Van Camp, N. (2009). Stiegler, Habermas and the Techno-logical Condition of Man. *Journal for Cultural Research*. 13 (2), 125-141 (<https://doi.org/10.1080/14797580902786473>).
- Wellner, G. (2022a). Digital Imagination: Ihde's and Stiegler's Concepts of Imagination. *Foundations of Science*, 27, 189-204 (<https://doi.org/10.1007/s10699-020-09737-2>).
- Wellner, G. (2022b). Digital Imagination, Fantasy, AI Art. *Foundations of Science*, 27, 1445-1451 (<https://doi.org/10.1007/s10699-020-09747-0>).

«Imagi(ni)ng Technologies»¹ On Don Ihde's Postphenomenological Account of Technoscience: What is It Really Made of?

Riccardo Valenti

Abstract. Don Ihde (1934-2024) has been one of the most influential philosophers of science and technology in the last five decades. Deeply influenced by Husserl, Heidegger and Merleau-Ponty, Ihde developed what he labelled postphenomenology, i.e., a doctrine offering a phenomenological account of the ever-increasing impact of technology on our daily lives. In his reading, technological supports such as material tools and cultural artefacts allow us to broaden the scope of our gaze and, likewise, to extend the range of our knowledge undefinedly. According to what he outlined as the empirical turn characterizing the postphenomenological agenda, Ihde argued for the «technological trajectory» leading technoscientific drive consolidating the embodied and material hermeneutic processes that corroborate and exceed the constitutive and natural «limits of human vision» (Ihde 2009, 52-56). For him, current technological capacities enable us to detect unseen phenomena, i.e., previously invisible things, when employing our bare and unaided eyes. This equally applies to visual analogies and isomorphisms, i.e., the telescopic or microscopic image rendering of very small or huge things, which are nowadays visible through special lenses, and to more sophisticated hermeneutic translations, as it is apparent in the case of radio astronomy, for instance, representing a «new way of bringing close something that is both spatially and perceptually distant» (Ihde 2009, 56). For Ihde, seeing what was invisible just a few years ago results from a cumulative and communal process spanning multiple generations of interpreters and cultures in its progressive formation and constant improvement. Moreover, it is an outcome that is always provisional, perfectible, and achievable only through technological media. However, it is not just about that. Seeing what was invisible, presents challenges we can only meet by employing these renewed hermeneutic interpretation tools. In a way, we only understand what is seeable (Heidegger 1976, 349-352). Indeed, this tele-vision is only temporally and technologically attained, and more than a synchronic rendering would be needed to justify it. As Ihde holds, only a diachronic vision can work out, and this is possible when science is «technically embodied» and becomes «technoscience» (Ihde 2016, 80). For him and his visual hermeneutics, this enhanced understanding of the world enables us to grasp multifaceted phenomena like the greenhouse effect (and to deal with them accordingly). Indeed, this singularity would be incomprehensible for a single subject or a unique generation of scientists working on its discovery. My contribution aims to pay tribute to Ihde's work just months after his passing by showing the main features of his postphenomenological empirical turn and proving their consistency (or not).

Keywords. Technology, Technoscience, Hermeneutics, Diachrony, Intersubjectivity

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¹ This is a paraphrase of (Ihde 1998, 163).

1. Introduction. Presenting Don Ihde's *phenomenological* and *instrumental* realism

The recent passing of American philosopher Don Ihde has left behind a significant intellectual legacy that warrants special attention. Alongside Albert Borgmann, Hubert Dreyfus, Andrew Feenberg, Donna Haraway, and Langdon Winner, Ihde epitomized what Hans Achterhuis once presciently defined as the *empirical turn* in the philosophy of technology (Achterhuis 2001). This current of thought, primarily cultivated in the United States, seeks to comprehend the new and current conditions of experience upon which the contemporary subject relies. It begins with the methodological premise that individuals live immersed in an increasingly technological and industrialized environment, which forms the foundation of their current lifeworld or *Lebenswelt*. Ihde is widely recognized as one of the inventors of *postphenomenology* (see Ihde 2009) – a doctrine rooted in phenomenological tradition that underscores technology's profound and pervasive influence on everyday human existence. As observed by Verbeek, Ihde's philosophical inquiries primarily revolved around the specific «relationship between human beings and technological artefacts» that are invented and continuously advanced and the resulting «mode of world disclosure» (Verbeek 2001, 123) facilitated by these «telic» (Ihde 1979, 31) and increasingly sophisticated prosthetic extensions. However, it is evident that despite the apparent originality of his numerous works – to which this essay is dedicated – this theme was not entirely unprecedented in the classic phenomenological discourse.

The focus on technology and technological aesthetic mediation was implicitly present in Husserl's work and, more prominently, in the writings of Heidegger and Merleau-Ponty. These authors initially demonstrated how sensory knowledge utilized tools beyond the mind and body through the complex concept of *embodiment*, as exemplified in Husserl's exploration of *writing*; the proper use of the «hammer» in Heidegger's case (Ihde 1986, 88) and the famous «blind man stick» argument Merleau-Ponty speaks of in the *Phenomenology of Perception* (Merleau-Ponty 2002, 165–166).² I will argue here that Ihde's merit lies explicitly in taking these positions to extremes, showing even their more hidden theoretical implications. Indeed, like other phenomenologists, Ihde was not satisfied with what he labels as a traditional or «idealistic view» (Ihde 1983, 27) of the philosophy of science or related epistemology, according to which *science*, i.e., theory, would precede the suitable invention and subsequent appliance of *technology*, i.e., the actual and practical means properly granting the possibility of science's theoretic advancement and constant progression (see Rosenberger 2023, 253 ff). On the contrary, technological processes, i.e., the *embodied* and *hermeneutic* possibilities (Ihde 1979, 36) they bring forth, should be the ones to be accounted for in science's effective progression, according to Ihde, and not only their *necessary* – but, on closer inspection, reasonably *ancillary* – practical implementation. Indeed, for him, scientific foresight and *imaginative* future grasp profoundly depend on technological resources and their practical disposition, not vice versa.

Moreover, Ihde expresses himself harshly against the idea that technology and the related applied science would have *theoretically* and *historically* compromised the original purity of perception or sensible investigation at the beginning of scientific theory, which, on the other hand, according to the *empirical turn* he defends, was *already technologically informed all along* (see Heidegger 1976, 342–343; Jayanti 2019, 72). Ihde accurately recovers this understanding in specific passages of Husserl's polemic against Galileo Galilei and modern philosophy, especially in paragraph 9 of the *Crisis* (Husserl 1970, 23–59; Ihde

² The same argument is also present in Polanyi's (1962) and Bateson's (1973) works that I am not considering here.

1998, 48).³ This recovery is necessary to make explicit the «instrumental realism» (see Ihde 1991) he advocates in his major works. Indeed, Ihde states that perception and essential *visualism* in science explanation was also profoundly and programmatically «technologized» (Ihde 2001, 42) as far back as the ancient Greeks at least, and the mathematization behind the «idealization» and «formalization» procedures «which eventually becomes geometry», in Husserlian terms, directly, *historically* and thus *eventually* emerged «from measuring practices» (Ihde 2009, 28), i.e., from concrete and yet already absolute *technological concerns*. Perception always profited from *measures*, i.e., from more and more exact technologies or technological means that would improve or sublimate its *de jure* natural performance to appreciate what remained only temporarily *invisible*. In Ihde's terms, this condition has always been part of perception's «eidetic or invariant features» (Ihde 1979, 22), i.e., a fundamental condition of possible experience. From this perspective, Husserlian teleology remains a central and straightforward aspect of Ihde's *technoscience*. In his view, technology reveals the true nature of things, which finally becomes visible and therefore understandable to us. According to this claim, *technology enhances rather than conceals what it shows*, unlike what Husserl argued when discussing Galileo and the curious properties of his «genius» (Husserl 1970, 52; Ihde 1983, 49). This is what Ihde's *instrumental* but avowedly *phenomenological realism* is constituted of, which I will analyze in this essay, starting from its historical roots, to show some elements of possible development or potential criticality in the following.

2. Position of the problem(s). What is still to be seen? Some technological and social concerns

Indeed, Ihde overturns Husserlian skepticism towards *mathematization* – or its prodromes, in early modern thought – and arguably reserves tremendous faith or «epistemic optimism» (Jayanti 2019, 74) in the scientific positivism that forms an inescapable backdrop to our natural-born *Lebenswelt*. However, I believe Ihde also maintains some hesitations about the very status or *deep* impact of technology itself, as I shall try to show in the following. As a cultural product, technology appears to be a human factor, constitutively incomplete and always emendable (see Heidegger 1976, 344). According to Ihde, its consolidation is mainly due to the historical contribution of the human communities – as I will claim by commenting on the *earth practitioners'* case – that, over time, justify its use and, by coming together both *synchronically* and *diachronically*, also enable its coherent development, as Ihde also elucidates when reading Husserl's *The Origin of Geometry* to support the primitive *technological* foundation of phenomenological philosophy. That said, I reckon the former *temporal* and *transcendental* character has partially remained in the shadow of phenomenological – and postphenomenological – reflection and has struggled to find full backing for this entirely *social evidence*. I also think a more conscious reading of the *Origin* may reveal a latent amphiboly in Ihde's thought. I will try to show this in the seventh paragraph of this paper. There, I will take up the interpretation that Ihde himself provides of the *Origin* to do this.

Moreover, following Ihde, I also hold that knowledge makes its way *into human groups*; that is, it is formed sociogenetically and is realized by the appropriate – technological – tools that gradually inform their efforts. However, as I will attempt to clarify in the following, Ihde does not peremptorily explain whether «technologies are conditions for or occasions of advance in idealization» (Ihde 1991, 46), leaving the question of the ultimate

³ Despite Heidegger's importance in Ihde's reflection, I choose to dwell only partially on his contribution, particularly in the fifth and sixth paragraphs, due to argumentative choices.

origin of *geometry* unanswered (i.e., whether its offspring is *social* or rather *technological*, or both, and in which sense). A few questions will emerge, given these considerations. Indeed, according to Ihde,

i) is technology a pure transcendental condition or an empirical occasion that justifies the *institution*, in Merleau-Ponty's terms, of a given knowledge at a given time in human history?

Or, if the material and thus the technological dimension of experience only plays a «facilitation role» (Ihde 1991, 46) in this constitutive and cumulative path, as Husserl's examples illustrate,

ii) does it have the *last word* on this ongoing transformation of our *Lebenswelt* and the means we have to deal with it?

Again, if «technologies incline rather than determine» (Ihde 1990, 183), this process of becoming known of the unknown or of the seen of what *is still unseen* or *to be seen*,

iii) what solidly remains of the *hermeneutic* mediation Ihde speaks of or the phenomenological organic *opacity*?

I will, therefore, begin this paper by tracing the phenomenological matrices of Ihde's argument before outlining the more original features of his thought. I will illustrate the main qualities of the *instrumental* interpretation Ihde gave of Husserl's *Crisis*, particularly the critique he moved on Galileo's method. I will then expose the points allowing Ihde to prove the *primacy of technology* in sense-experience and why Husserl's account of Galileo's traditional claim must be reconsidered in the light of a more careful reading of his discoveries and the related history of science. The conclusion I will draw from this first part is that, in reality, Galilean *technoscience* proceeds by progressive obscurations and unveilings of meaning, as Husserl correctly claims, but the former is, however, *of equal dignity as the latter* (paragraph 4). This fact denies, in my reading – and Ihde's – the questionable purity of original sentience, which is always, and retrospectively, *technologically* biased.

3. Galileo untold. Against *mathematization* and towards material hermeneutics

I hold the overall intention of Ihde's works is to restore full dignity to technology as a genuine and, most importantly, *primitive* tool for knowledge. According to him, technology should no longer be understood as the handmaiden of science but as its actual *engine*, i.e., what makes science what it is (see Heidegger 1976, 345). Curiously, Husserl – one of the main phenomenologists Ihde considers – had an ambivalent opinion of technology and its findings.⁴ This view emerges most clearly in *Crisis*. Accordingly, Husserl's *Crisis* represents a keystone and a necessary moment of reflection to rethink the author's previous production and the general *responsibility* of phenomenology about a more comprehensive theory of knowledge, both on a sensitive and intellectual account. In this text, Husserl calls into question the entire Western rationality, i.e., how our scientific method has attained outstanding results we can appreciate nowadays.

⁴ I support this by relying on reading the text of *The Origin of Geometry*, which I will comment on in the seventh paragraph.

Crisis brings a rebuke and a profound critique of this specific way of doing science. However, in Husserl's opinion, why would it be so harmful if it produced such evident and beneficial results? At what cost would it have obtained, and what would have gone wrong? For Husserl, this method would be guilty of neglecting the primitive evidence of the so-called lifeworld or *Lebenswelt*, i.e., the natural or primordial source of knowledge and complete sensible trustworthiness of everything surrounding us. According to this viewpoint, this negligence progressively pushed scientists to fall back on the abstraction of mathematical models they relied on, which are the only ones capable of rendering the complexity of their breakthroughs.⁵ Moreover, such forgetfulness would have produced an unbridgeable distance between the observer and the things *themselves* and a whole series of relationships that the phenomenological method aims to reconstruct on new, more solid, reliable bases.

In this text, Galileo Galilei is the forerunner of this nefarious manner and thus the main culprit for the resulting forgetfulness.⁶ According to Husserl and here quoting Ihde, «in inventing the modern science», Galileo «forgets the lifeworld and its perceptual, praxical, historical, origins and distances and substitutes an idealized, abstracted world of mathematics for the foundation» (Ihde 2016, 43), i.e., for the proper justification of the former. Contrary to this pragmatist idea of forgetting, Husserl aims to retrieve the *concrete practices* giving rise to what he calls the natural «origins of geometry» (Ihde 2016, 43), i.e., the different and authentic groundwork of every successive and superior mathematical act of *measurement*, here meaning the practical and *perceptual* relation we entertain with our nearby world and the objects we may find within. For Husserl, Galileo would have provided a vague and artificial account for our everyday sense experiences because the

⁵ Husserl associates this practice with *geometry*. He holds both a positive and a negative account of this discipline when he combines it with techniques. This is a feature that Ihde also noticed. According to Husserl, we are all and act like «geometricians» (Husserl 1970, 26) in scientific discovery. We all employ the same *instruments*. Here, the geometric lexicon should not only be applied to *geometricians* or so-to-say scientists. Instead, we Western people have proven to all be united in a complex «geometrical task» (Fink 1995, 177), as Husserl writes to Fink, i.e., to be committed to a «methodology» which is «universal» (Husserl 1970, 27–28) and eventually becomes all-encompassing. The geometrical task follows a teleological principle according to which what is intuited in perception goes through a process of refinement, progressive approximation to ideality and the tendency to attain pure forms. Due to the «universal inductivity» dominating the «intuitively given world» (Husserl 1970, 38–39), this method also entails an *indirect mathematization* of sensible qualities, as the case of *plena* testifies, and so a sense of alienation that is patent in modern science. Husserl holds this inductive process may only successfully lead to a knowledge of «predictions [...] which can be carried to infinity» but does not attain «real evidence» (Husserl 1970, 50–52), i.e., the intuitive content that phenomenology instead aims to grasp.

⁶ The figure of Galileo has often been the subject of ungenerous criticism. In *Human Condition*, Arendt blames Galileo for neglecting the «adequacy of senses» in his scientific model, making him one of the best representatives of the «Archimedean wish» (Arendt 2019, 261–262) of dominating nature. Following Arendt, the mathematization of algebra beyond the contribution of original *geometry*, here intended as the ancient practice of land surveying and division, forced the latter to abandon concrete domains of experience for ideal abstraction. This also distanced the observer from the direct object of observation, collocating the former on a «cosmic, universal standpoint» (Arendt 2019, 270) upon which everything seems unrelated to justify even the most ecologically nefarious actions. The same goes for Serres and the fact that we «have lost the world», and we did so when we have endorsed «*acosmic* philosophies», i.e., those that only respond to «[m]astery and possession» (Serres 1995, 29–32). I will not deal with these authors here. However, one of the aims of this paper section is to restore a phenomenological and, above all, postphenomenological, less unfortunate interpretation of Galileo's contribution to science.

mathematical models upon which his speculation is based are useless for comprehending what our *Lebenswelt* is genuinely made of.

So, in his reading of Galileo, Husserl would draw a straight line separating the «prescientific» and the «scientific or objectively constituted world» (Ihde 2016, 45) and, with that, the classical distinction between «primary and the secondary qualities» (Wilsche 2017, 156) in object experience, finally detaching for good the domain of undisputable and valid science from the one of aesthetical and less relevant appraisal. Indeed, following Ihde's claim, this vision would also lead Husserl to the eventual devaluation of scientific enquiry *tout court*, thus *bringing him to forget*, this time, the astonishing strides made by Galileo's «contemporary science studies», including «multidimensional practices that include internal culture, embodiment in machinery», naming processes that «*only part of which is mathematical*» (Ihde 2016, 47, emphasis mine), i.e., only part of which abstractly constructed and beyond the grasp of the sensible and visual data confirmation of the *Lebenswelt* we are in. For Ihde, Husserl would have misinterpreted Galileo's thoughts and the typical or conventional «distrust of the senses that was rhetorically popular in his time» (Ihde 2016, 47), i.e., in the 16th, 17th and 18th centuries, and this was mainly because of the ever-improving technologies that scientists like Galileo could dispose of by the exact historical period Husserl is here implicitly considering (see Cahoon 1986).

Thus, Galileo would not have totally undervalued sensory experience in favor of absolute mathematical rigor – to which suitable observation can lead in technoscience – *but only criticized a particular way of seeing and interpreting things he could see differently*.

4. On what *Lebenswelt* really is. Revelation and concealment are two sides of the same coin

According to Ihde's reading of Galileo – and revisitation of Husserl's – the former faculty of seeing, indeed, the one primitive, natural and made possible by unaided or naked eyes, turned out to be just *unfitting* for some of the astronomical objects it tried to reach, as it became apparent when employing a prosthetic device such as a telescope for the first time, for instance, in Ihde's historical reconstruction. Indeed, some objects can be «closer than they appear» (Morton 2013, 27; 2018, 10), as Morton recently claimed too, but also much farther away and in a different shape, size or color than how we saw or imagined them from our limited and earthbound perspective. Indeed, the employment of more sophisticated means of scientific apperceptions and discoveries, such as the well-known «telescope» in Galileo's particular case, led to a dramatic «perceptual shift» (Ihde 1990, 56) of the human eye's natural possibilities. This shift, i.e., the newly acquired ability to see new things, previously invisible, or to see them in greater detail, *historically* became only possible through the employment of «new instrumentation», hence granting brand «new perceptions» (Ihde 1990, 56). Indeed, a telescope, as a technological tool and as a matter of «technoscience» or «instrumentally embodied science» (Ihde 2016, 80), lets us see what we do not see clearly and does so by constantly adding more details during the time of our observation but, also, what we do not see at all and thus «let be» (Ihde 1979, 10) particular and new objects for the appreciation of our enhanced or new-born sensibility.⁷

So, following Ihde, Galileo actually «*never leaves the lifeworld*» (Ihde 2016, 55, emphasis mine; see also 2022, 114), he is in because the employment of scientific apparatus from which he can derive his new knowledge does not represent an undue and *mathematical* – in Husserlian terms – abstraction of the scope of the lifeworld he just wanted to analyze

⁷ As I will say, it is difficult to settle the question around Ihde's realism, which also suggests a correlationist position with ambiguous features.

with more clarity.⁸ Conversely, only the necessary *embodiment* of the latest scientific means, i.e., the practical use of the latter made available to humanity from the very day of its first discovery and application, can «amplify and magnify ordinary capacities», enabling us to extend the scope of our gaze indefinitely and thus see and theologially accept, for instance, the telescopic details of moon's «mountains, seas, and craters» (Ihde 2016, 50, 56; see Sartenauer 2014, 33-35). So, I claim that while recognizing Husserl's point value – since Galileo does not improperly *mathematize* the lifeworld – Ihde also rejects the vision of an immaculate lifeworld where technology imposes itself and forever pollutes its vision. Indeed, the vision has never been *pure*, and the substitution of one paradigm for another, in Kuhn's terms, is not neutral, but neither is it harmful in itself (see Ihde 2022, 2). As Ihde holds, «for every revealing transformation of the world, there is a simultaneously concealing transformation of the world which is given through a technological mediation» (Ihde 1990, 49; see Heidegger 1976, 345). Furthermore, as evident in Husserl's argument regarding the Galilean scientific method and innovation, technological progress always entails «both gain and loss» (Ihde 1990, 17). Indeed, to *gain* a deeper understanding of something, to go further in vision, it is necessary to *sacrifice* some level of detail or to accept as given what was previously appreciated through the senses, as elucidated in Husserl's concept of *horizon* or phenomenological «sedimentations»⁹ and the related *positive* account of technology and maintenance of knowledge he endorses, which I will delve into further in the following (see Rhéaume 2016, 47-49).

Finally, I claim that while the necessity of aesthetic mediation and the instrument's inherent potentialities and limitations remain integral to the scientific and phenomenological experience, according to Ihde's technoscience, such *mediation* can be progressively reduced or refined. In the next paragraph, I will explicitly explore this multifaceted aspect of technological mediation and Ihde's interpretation.

5. Introducing *knowledge gathering technologies*. On Ihde's embodied and hermeneutic relations

Indeed, Ihde contemplates the lesser or greater possible influence of technological mediation in science representation. This influence ranges from difference of degree to sheer difference of nature. He argues that by formally admitting a solid distinction between «embodied» and «hermeneutic relations» (Ihde 1979, 36) in aesthetic experience, as he seminally does in his first original work, *Technics and Praxis*. Accordingly, embodied relations are those in which the instrument, i.e., the external tool, is *physically* and directly implemented in the subject's body and becomes, to all intents and purposes, the organ through which the subject appreciates the surrounding world. Glasses, or contact lenses, pertain to this realm, for instance. Indeed, the embodied relations, considered this way, are closer to the ones that classical phenomenology had already contemplated. In this sense, Heidegger's hammer remains firmly attached and adherent to the hands of the subject who uses it, and so does the stick the blind man employs in the example of Merleau-Ponty. Here, the latter genuinely becomes an additional but completely annexed part of his body when

⁸ «[T]echnoscience was never separated definitely from the lifeworld» (Ihde 1998, 153), which always remains the common ground in which every discovery rests, settles, or is progressively culturally reabsorbed, granting the new ground for knowledge eventual spread (see Ihde 2010, 85-86).

⁹ For Husserl, these sedimentations are indispensable for meaning to be «stabilized and communicable across space and time», for they provide, accordingly, «the historical process spanning generations» of geometricians (Blomberg 2019, 79, 81).

used, i.e., a tool of extended sensitivity and not just a factor of unfortunate bodily compensation. Accordingly, this addition does not alter the primordial nature of perception, that is, what a healthy subject would see or could see under certain and ideal circumstances, but only extends its range of effectiveness. In a sense, the closed fist or the palm of the open hand would make or substitute the hammer work, even if this would be way more complicated than the carpenter at stake had initially realized.

Similarly, the blind man may be able to do without the stick. Indeed, the stick *facilitates* or *inclines* certain operations, making them drastically easier to perform but not allowing him to do what is just beyond human possibilities. Phenomenologically, this does not cause particular problems for reflection. However, things get complicated when the mediation becomes more pressing and evident, as in the case of Galileo's employment of the telescope. Indeed, as the nature of Ihde's *hermeneutic relation* prescribes, the instrument no longer physically adheres to the observer's body. Indeed, the instrument is not nor becomes a part of their body; it does not count as such within the dynamic unity of its body schematism, as Merleau-Ponty would have claimed. If we adhere to the previous examples, the instrument does not straightforwardly transform into the subject's eyes or hands. Instead, according to the sketch that Ihde reports in *Technics and Praxis* and other writings (see also Ihde 2012, 103), the object or the observed world in its entirety shows itself through the lens offered by the instrument, revealing characteristics that would otherwise be unattainable by the unaided or natural eye. In a certain sense, the instrument *provides* this spectacle, and no longer does the observer's body that properly learns to use it. The telescope's lens *sees* a given aspect of the celestial body, not the eye of the observer. This also seems to be the core of the Galilean argument: anyone could see that they are right if only they would look through the lens, i.e., if only they would accept to see the world with different and *technoscientific* eyes (see Hasse 2018, 246 ff). In Ihde's words, this *hermeneutic* shift produces both an increase in a «series of gradation» in the sensible rendering of the world and more dramatic and theoretically questionable «qualitative changes» (Ihde 1979, 33), again, in the *visual* restitution of this aesthetic complexity. Only in this second case do «knowledge gathering technologies» (Ihde 1979, 36) play a crucial role in Ihde's *technoscience*. Indeed, complex and *invisible* features progressively become *visible* and theoretically acceptable «through the development and embodiment of knowledge gathering through instrumentation» (Ihde 1979, 36).

On closer inspection, the phenomenologically-based *embodiment* I mentioned above also slips and changes place in the relationship we possibly entertain with our *Lebenswelt*: it is the *body* of science, i.e., of its operational *instrumentalization*, the one becoming the genuine organ of knowledge and its conceivable advancement. In this sense, for Ihde, the aesthetic continuity is preserved or sublimated in the new *corpus* of meaning responsible for its constitution and maintenance.¹⁰ This eventually provokes dramatic changes in *macroperception* or socio-cultural domains of science comprehension and data diffusion, as he mainly clarifies in *Instrumental Realism* (see Ihde 1991, 22). This shift also often elicits unconscious historical paradigm substitutions, i.e., the fact that things previously considered erroneous have become accepted nowadays or unusual tools have become the main ones responsible for accurately understanding things, as seen with the telescope and its incredible astronomical legacy. This is what happened, according to Ihde, with the use of X-rays in medicine or all those technologies that compensate for our natural inability to see things naturally *invisible* to our eyes (see Ihde 1998, 152). Indeed, X-rays, MRI, and other alternative *sensible* means of data acquisition and *hermeneutic* rendering do not limit

¹⁰ The text I am considering here is from 1979, so *digital* and so to say, *immaterial* possibilities were less developed than today. However, Ihde did not neglect this point in more recent works, as I will claim in the following.

themselves to make us see what we do not *as we would do* if we were actually able to penetrate the flesh of those we want to heal in this case, as physicians of all times or epochs wished to do. The machine using X-rays does not see with our own eyes *but with its own*, as do modern telescopes when making us see or give us the account of lightyears distant galaxies, also on a partial yet less relevant as initially thought *inductive* account, something Husserl would not have accepted in these terms either (and neither does Ihde, as I am going to claim in the following paragraph).

So, the images we can now appreciate, thanks to this more and more refined *instrumentation* process, are nothing but the hermeneutic *translation*, in human language and means of comprehension, of specific entities we otherwise could not sensibly grasp, but which is accomplished using tools that we have constructed and learnt to read and decipher, as I will claim in the seventh paragraph. Indeed, as Morton said, the things we now perceive are not how they phenomenologically *appear*, i.e., how we sensibly appreciate them. In my opinion, as I argued in the conclusion of the previous paragraph, this proves that a certain phenomenological *opacity* always remains and that the technological mediation, in this case, can be shifted but never cancelled altogether.¹¹

6. Whole earth measurement. On seeing the invisible

This is also why I believe the *hermeneutic* and *post-perceptual* moment preserves specific importance over *induction* possible drifts in Ihde's thinking. Indeed, in his work *Expanding Hermeneutics* and the *Whole Earth Measurement* central claim (Ihde 1998, 50-60), the author argues that the shift towards always better yet increasingly less intuitive and technologically abstract mediation should not be solely nor primarily interpreted based on inductive reasoning or least not in its most direct implications today, as Husserl's Western rationality was paradigmatically supposed to do. Indeed, *actual* modern science and *mathematization* have gone separate ways. According to Ihde, and in alignment with Husserl, we can phenomenologically comprehend something as long as we can perceive it, even vicariously rather than intuitively, in a certain sense, or personally. Therefore, our grasp of things and our control over them extends along the range of our gaze and the interpretative *moment* that follows, as proposed by Ihde with his justifications of *hermeneutic relations* and their many theoretical implications. According to this view, the advancement of technology is the primary driver of science and thus of our knowledge, which in turn shifts by increasingly differentiating, quantitatively and qualitatively, the value of the always necessary instrumental mediation. But suppose hermeneutics and its *moment* make us see beyond, i.e., where our eyes could not reach. In that case, as it is, technology allows us to consistently consider those aspects of the world we previously did not know about and we can now *technologically* appreciate.

Indeed, in *Expanding Hermeneutics*, Ihde states that we can *perceive* the «Earth-as-planet» (Ihde 1998, 57), i.e., Earth on a genuinely global scale and thus *sense* what is happening – has, or will happen – on its soil, and in every moment we wish to, thanks to ever-improving technological *worldly* appreciation we can profit on. This is done through the use of ever-increasingly powerful surface scanning tools, such as modern satellites. Ihde also proves this point by considering the case of the *greenhouse effect*, i.e., strange evidence which would be difficult to explain and comprehend in a classic phenomenological account. Suppose we take Morton's *hyper-objective* and *meshy* categories momentarily

¹¹ See also Heidegger's *The Age of the World View* on the «distinctive type[s] of greatness» that follow one another in the course of technological advancement (Heidegger 1976, 354 – partially modified).

(see Morton 2018, 42-46). We would immediately feel uncomfortable in realizing the *viscosity, non-locality, temporal undulation, phasing* and *interobjectivity* of complex phenomena like global warming and the greenhouse effect, i.e., the reality and the hermeneutic relevance of *hyper-objects* that are only visible and intelligible as such by innumerable intuitions and thus *registrations* extended to technological *measurements* also operating in place of our senses (see Shirokanova 2014, 120). According to Ihde's technoscientific claim, current instruments give full-blown «access» (Ihde 1998, 57) to phenomena like these. Indeed, current instruments here can easily recognize those and provide a worthy representation of them. When they do this, the «[g]reenhouse gases» we can account for are not just «“inferred”», i.e., are not *mathematically* and improperly anticipated without material support and eventual sensible confirmation, as Husserl would polemically claim against Galileo, but are «“instrumentally” perceived» (Ihde 1998, 57), i.e., they count as legitimate *phenomenological* phenomena.¹² In this sense, planet Earth becomes «measurable» or will be teleologically and *eventually measured*, given the indefinite series of representations we had or can have of it, thanks to the orbital satellites above it making it «instrumentally presentable» (Ihde 1998, 53).

Yet, in discussing Ihde's hermeneutic mediations, I believe we should address a latent yet existing feature that needs further attention. Based on what has been said so far, I hold that the instruments Ihde speaks of are created over the succession of cultural traditions as legitimate expressions of the joint commitment of different scientific communities. This sequence of *substitutions* or improvement phenomenologically reveals scientific progress and validates the advancement of knowledge through the material supports on which it relies. Now, I reckon it is also essential to underlie the *temporal* and, thus, *historical* evolution of a sort of «structural truth» (Merleau-Ponty 2010, 52) that allows us to technologically grasp phenomena under continuous transformation and for which only the constant upgrading of tools can adequately account. I believe Ihde suggests this claim by introducing the regulatory idea of *diachrony*. He mainly does so in *Expanding Hermeneutics* (Ihde 1998, 50) and *Husserl's Missing Technologies* (Ihde 2016, 80). By *diachrony*, we should here mean a conception of time passing that focuses on the cohesive succession of its units rather than its *synchronous* and, thus, immediate blending. Indeed, according to Ihde, in scientific representation, a *synchronic* time rendering alone would be unfitting when trying to depict what *hyperobjects* are, such as the greenhouse effect, in Morton's account. Arguably, a «*synchronic* whole Earth measurement» (Ihde 1998, 50), i.e., the hypothetical and technological possibility to *instantaneously* calculate the entire planet's countries and territories temperatures at once, would not be sufficient to understand what the greenhouse effect really is, because «very longtime records» must also «come into play» (Ihde 2016, 80; see Kenderdine 2015, 33; Wapner & Matthew 2009, 216) to properly define it. As Ihde holds, indeed, this synchronic evidence would be nothing but a «blip» in the much longer and «*diachronic* history of Ice Age cycles over the last ten thousand years» (Ihde 1998, 50-51), i.e., the fulcrum of *deep* terrestrial eras we should precisely consider when trying to detect this terrific heat raising (and, namely, to when we *now* know we must trace the urgency of this phenomenon back, taking as a landmark something seemingly far removed from our present encounter).¹³

¹² As Ihde argues, «technologically mediated perceivability» phenomenologically «reduces and transforms the presumed strong distinction between Husserl's plenary perception and the equally presumed indirect and abstract reduction to merely pure shapes» (Ihde 1998, 53).

¹³ As Ihde says in the following, earth measurements «must also be related to the *diachronic* readings of the past», which in turn «are made possible by the material “calendars” left by the Earth itself» (Ihde 1998, 59).

Current scientific methods and computer modelling enable this *diachronic* reenactment and thus to fully appreciate this complex data, i.e., a piece of *perceivable* unitary information yet composed of multiple, cumulative temperature reports across innumerable ages. Still, this sensible awareness is a recent and fully *hermeneutic* achievement and, in some ways, an always improvable «technique», according to the terms Ihde employs in his books. Indeed, none of us was present in the Ice Age, but neither was the technology we used to see it. Nonetheless, we somehow can see what it was and what the melting of ice *meant* for our planet's life's present spread. For Ihde, scientists who want to understand this fact, i.e., global warming, along with the greenhouse effect and its consequences, must learn to «read» the many «interrelations» (Ihde 1998, 59) underlying Ice Age *sensible* and *deep time* confirmations (see Hird 2013, 109, 117). When they do so, they effectively run a «reconstructive» (Ihde 1998, 59) capability they can profit from because of current technoscientific means, i.e., the ability to retrace in an *instant*, even implicitly, all previous measurements to grasp the significance and ecological weight of the present one (and what those who come after will have).

7. What *technoscience* is truly based on (?). To-and-fro *The Origin of Geometry*

Before coming to conclusions, it is necessary to take one last step forward and explore possible elements of conflict that I mentioned in the second paragraph. As stated earlier, while I think it is consistent that technological progress substantiates the value of these discoveries, it is also worth remembering the *historical* evolution and *inter-subjective* support on which this progress always rests since the *correlationist* and, ultimately, phenomenological assumption of *world disclosure*, as held by Verbeek, cannot be overcome entirely in Ihde's *realist* perspective. Furthermore, it is vital to specify how these *historical* and *intersubjective* features can phenomenologically stand together and interact in this «asynchronous simultaneity» (Verma 2017, 8) of the data they carry and that Ihde emphasizes concerning technological records and *all-time* evidence. Indeed, Ihde did not overlook this aspect. In *Expanding Hermeneutics*, he paradigmatically asks himself, «[h]ow many phenomenologists does it take to detect "Greenhouse Effect"?» (Ihde 1998, 50); I believe by invoking these very theoretical issues (and a funny joke, too). From this point of view, it is not sufficient to ask how this greenhouse effect became visible but also to whom one(s) should *ultimately* attribute its discovery or *origin*. Accordingly, only «many earth science practitioners» could realize the diachronic and hermeneutic «generalization» (Ihde 1998, 50), leading to the progressive identification of this complex, otherwise invisible piece of evidence. Indeed, those practitioners profited from technologies that allowed them to grasp the countless traces of that phenomenon, *communicate* them, and come together in a unitarian intra- and intergenerational community of solid scientific commitment.

I claim this interpretation is *phenomenologically* sound if we also consider the bright side of Husserl's ambivalence on technological mediation, of which Ihde is aware in his attentive reading of *The Origin of Geometry* and mainly proves in *Instrumental Realism* (Ihde 1991, 18, 46) and *Husserl's Missing Technologies* (Ihde 2016, 24). *The Origin of Geometry* is the third Appendix of paragraph 9 of the *Crisis*. It is relevant in this context because of the specific attention Husserl here dedicates to the question of *writing*, i.e., the primordial *technological* faculty of pinning down some pieces of information we consider essential or worthy of being read and passed on to someone who might read them in the future. Husserl is primarily interested in this «technique» because he believes it is crucial to show how his theory of sedimentation (see D'Amico 1981, 11), the eventual reactivation of a given content, and the historicity of the *a priori* works (see Husserl 1970, 362; Pradelle 2008, 236). Moreover, in *writing*, Husserl underlines the quantitative-qualitative shift that

Ihde also upheld in his material hermeneutics. Indeed, according to Husserl, writing «raises consciousness to a higher level» (Ihde 2009, 20; see also 1998, 187; Housset 1997, 203-204), also granting the possibility of «accumulation» and the «progress of idealities» (Ihde 1991, 46) as well as its «perfectible» (Thierry 1997, 94) and intimal constructive nature.¹⁴ Indeed, in Husserl, writing gives a specific essence and duration to the content they aim to express and results in «communalization» (Husserl 1970, 364), banding fellow geometricians at work in the constitution of the sense of a composite «ideality that no one has ever thought» (Merleau-Ponty 2001, 57) as a single or isolated individual. This technical reaching entitles synchronic and, most importantly, *diachronic* communication between different generations of exegetists (see Zhang 2021, 127, 133).

Still, according to this very text, «every science», i.e., every technoscientific enterprise, in Ihde's terms, «is related to an *open chain of the generations to those who work for and with one another*», namely «researchers either known or unknown to one another who are accomplishing subjectivity of the whole living science» (Husserl 1970, 355-356, emphasis mine; see Goris 2014, 15).¹⁵ Here, several generations of *geometricians* can bond using language and writing, indirectly subsuming and, from time to time, reliving the results acquired by the previous ones and instrumentally constituting the everlasting «community of geometricians» (Stiegler 2009, 230; see also Husserl 1977, 120-126), as we previously saw commenting on the case of the *many earth science practitioners*.

This said, I believe we find here, and perhaps on an equal level of importance, both in Ihde's and Husserl's texts,

i) the *technological* account offered by writing and *whole Earth measurements*, and, of course,

ii) the *intersubjective* aspect presented by the *many* writers and readers who use its means of dissemination or, in Ihde's case, the scientists' always at work.

This is, as I see it, a potential theoretical amphiboly. Indeed, while it is clear that the subjects in question communicate artificially through technologically evolving supports, like writing, science or technoscience itself nonetheless evolves through these social, intra- and inter-generational exchanges and, in a certain sense, owes its very improvement and ultimate foundation to them (see de Boer et al. 2018, 741).

8. Conclusions. «On cinematographic possibilities».¹⁶ What is still to be imagined?

Ihde's philosophical testament is significant and definitely worth reading. His death probably prevented him from seeing or fully grasping artificial intelligence's already astonishing current achievements. For this reason, I think Ihde perhaps remained too attached to a very *human* way of doing science, so to speak, and did not seriously consider an autonomous use of the technoscientific tools themselves, i.e., without a *social* reference

¹⁴ In this sense, the primitive repeatability of the *datum* and the further construction or *overwriting* of all knowledge – and *measurement*, in these terms – also pass through this very idea that sense may also be materially consolidated and intergenerationally preserved. However, this consolidation occurs within a historical and intersubjective *concurrence*, which rests on the eidetic possibility that the sensible world and its meaning can be *subsumed otherwise*, and in an entirely positive key, than the *mathematization* we have seen at work in Galileo's Husserlian perspective.

¹⁵ In *Instrumental Realism*, Ihde also acknowledges that Husserl, in this text, «embodies science in its community and activity» (Ihde 1991, 18). On this topic see also (Ihde 2022, 6).

¹⁶ (Ihde 1979, 90).

(see Langsdorf 2016, 114). In his prose, the hermeneutic moment remains a filter or a constitutive «opacity» (Ihde 1979, 12) that is always necessary to understand what the instruments make us see. For these reasons, in his reading, the latter are never independent entities and never break free from our aegis. From this point of view, Ihde is still very attached to classical phenomenology, at least in his commentary on Husserl and Heidegger. Despite the realist stance it claims to take, the content of experience and what technology allows us to understand has to make sense *to us*, i.e., increasingly distant yet still highly involved observers. But, as a matter of fact, if we also change, as our tools change, then the question remains as to how we will be able to interact with each other and with them tomorrow.

Moreover, Ihde never wholly endorsed nor understood the digital capacities of *hermeneutic* mediation – something that was perhaps within his reach – as Vincent Blok is currently doing. I will conclude my article by extrapolating a few excerpts from his current research, which I feel aligns with the general intentions of Ihde's work. According to Blok, the *datafication* of our visible and sensible world, i.e., the digital transformation and rendering of its physical and analogical coordinates, recently caused an epochal shift similar to the one caused by Galileo and his revolutionary employment of Lipperhey's telescope in the Modern Era. This revolutionary *ouverture* – of which we should not be afraid, as I argued above – also «disrupted our relation to the world as it destroyed the geocentric orientation» (Blok 2023, 12) and, in a certain sense, the whole world we used to live in before its detection. The same happened to humans who become «astral», as also pointed out by Arendt, «as they found a new Archimedean point in the universe outside the world», making the universe itself a world, i.e., «a new secure starting point on which our knowledge of the world can be based» and this thanks to «the technical mediation of the telescope» (Blok 2023, 12). Blok claims a similar thing is also going on now with the launch of *Destination Earth* or *Destin-E*, i.e., a «digital twin» or «real-time realistic digital model» (Blok 2023, 4) of a physical entity, as our planet is. Sponsored by the European Commission, this digital duplication aims to «predict the effects of climate change and the impact of adaptation and mitigation strategy» (Blok 2023, 4) on our planet, the latter possible only based on «comprehensive community dialogue» between the numerous institutions involved and «common understanding of usage scenarios» (Hoffmann et al. 2023, 2-3) along with digitally «shared infrastructure» (Nativi et al. 2021, 2).

This digital model will eventually compensate for our inability to proceed within *embodied* terms, in Ihde's words, or *hermetically* by trial and error by adding «new capabilities where advanced technologies can make a difference» (Hoffmann et al. 2023, 1). As a faithful copy of our physical world, *Destin-E* will, therefore, retain not only the lessons of the past but will also be able to develop consistent patterns for its future thanks to the «rich observational dataset» (Blok 2023, 4), it will rely on and the arranged ability to *diachronically* «visualize, monitor and forecast» events to come (Nativi et al. 2021, 6). Given its data-driven essence, this model will hopefully be able to lower itself into the *deeper* dimensions of past and future, thanks to its superhuman computational abilities and thus sublimating Toadvine's wish, for example, i.e., to gain «awareness of an ancient geological past that precedes us and opens our imaginations to an indefinitely distant future after us» (Toadvine 2024, 205). According to Blok, since this *deep* temporality is humanly inaccessible, «it is only via a supplement like a digital twin», like *Destin-E*, in the case of our planet, «that we have access to this origin while such a twin can never claim to re-present this original anymore» (Blok 2023, 22), or actually never did.¹⁷

¹⁷ With the same hope, Blok argues, scientists make use of artificial intelligence to complement and replace human and physiological intelligence because artificial intelligence systems «can interact

Bibliography

- Achterhuis, H. (2001) (ed.). *American Philosophy of Technology. The Empirical Turn*. Engl. R. P. Crease. Bloomington and Indianapolis: Indiana University Press.
- Arendt, H. (2019). *The Human Condition*. Chicago and London: The University of Chicago Press.
- Bateson, G. (1973). *Steps to an Ecology of Mind*. London: Granada.
- Blok, V. (2023). Philosophy of Technology in the Digital Age. The Datafication of the World, the homo virtualis, and the Capacity of Technological Innovations to Set the World Free. *Inaugural lecture upon taking up the position of Personal Professor of Philosophy of Technology and Responsible Innovation at Wageningen University* § *Research on 7 September 2023*. Wageningen: Wageningen University (<https://philpapers.org/archive/VINPOT.pdf>).
- Blomberg, J. (2019). Interpreting the Concept of Sedimentation in Husserl's Origin of Geometry. *Public Journal of Semiotics*, 9 (1), 78-94 (<https://doi.org/10.37693/pjos.2019.9.22182>).
- Cahoone, L. E. (1986). The Interpretation of Galilean Science: Cassirer Contrasted with Husserl and Heidegger. *Studies in History and Philosophy of Science*, 17 (1), 1-21 ([https://doi.org/10.1016/0039-3681\(86\)90016-6](https://doi.org/10.1016/0039-3681(86)90016-6)).
- D'Amico, R. (1981). Husserl on the Foundational Structures of Natural and Cultural Sciences. *Philosophy and Phenomenological Research*, 42 (1), 5-22 (<https://doi.org/10.2307/2107540>).
- de Boer B. et al. (2018). The Perspective of Instruments: Mediating Collectivity. *Foundations of Science*, 23, 4, 739-755 (<https://doi.org/10.1007/s10699-018-9545-3>).
- Fink, E. (1995). *Sixth Cartesian Meditation. The Idea of a Transcendental Theory of Method*. Engl. Trans. R. Bruzina. Bloomington-Indianapolis: Indiana University Press
- Goris, W. (2014). L'a priori historique chez Husserl et Foucault (I). La pertinence philosophique d'un concept directeur de l'épistémologie historique. *Philosophie*, 123 (4), 3-27 (<https://doi.org/10.3917/philo.123.0003>).
- Hasse, C. (2018). *Studying the Telescopes of Others: Toward a Postphenomenological Methodology of Participant Observation*. In J. Aagaard et al. (eds), *Postphenomenological Methodologies: New Ways in Mediating Techno-human Relationships* (241-258). Lanham: Lexington Books.
- Heidegger M. (1976). The Age of the World View. *Boundary 2*, 4 (2), 340-355 (<https://doi.org/10.2307/302139>).
- Hird, M. J. (2013). Waste, Landfills, and an Environmental Ethic of Vulnerability. *Ethics & The Environment*, 18 (1), 105-124 (<https://doi.org/10.2979/ethicsenviro.18.1.105>).
- Hoffman, J. et al. (2023). Destination Earth – A Digital Twin in Support of Climate Services. *Climate Services*, 30, 1-3 (<https://doi.org/10.1016/j.cliser.2023.100394>).
- Housset, E. (1997). *Personne et sujet selon Husserl*. Paris: Presses Universitaires de France.
- Husserl, E. (1970). *The Crisis of European Sciences and Transcendental Phenomenology*. Engl. Trans. D. Carr. Evanston: Northwestern University Press
- Husserl, E. (1977). *Cartesian Meditations. An Introduction to Phenomenology*. Engl. Trans. D. Cairns. Dordrecht: Springer
- Ihde, D. (1979). *Technics and Praxis*. Dordrecht and Boston: Reidel Publishing Company.

with the world in the present, are trained by past data, and extrapolate towards the future» (Blok 2023, 27). In contrast, human intelligence appears to be firstly and mostly «bound to an orientation on the future», and this is because of individual mortality, i.e., a «future death that will never become present as a data entry point» (Blok 2023, 27).

- Ihde, D. (1983). *Existential Technics*. Albany: SUNY Press.
- Ihde, D. (1986). *Consequences of Phenomenology*. Albany: SUNY Press.
- Ihde, D. (1990). *Technology and the Lifeworld. From Garden to Earth*. Bloomington and Indianapolis: Indiana University Press.
- Ihde, D. (1991). *Instrumental Realism: The Interface between Philosophy of Science and Philosophy of Technology*. Bloomington and Indianapolis: Indiana University Press.
- Ihde, D. (1998). *Expanding Hermeneutics: Visualism in Science*. Evanston: Northwestern University Press.
- Ihde, D. (2001). *Bodies in Technology*. Minneapolis: University of Minnesota Press.
- Ihde, D. (2009). *Postphenomenology and Technoscience. The Peking University Lectures*. Albany: SUNY Press.
- Ihde, D. (2010). *Heidegger's Technologies: Postphenomenological Perspectives*. New York: Fordham University Press.
- Ihde, D. (2012). *Experimental Phenomenology: Multistabilities*. Albany: SUNY Press.
- Ihde, D. (2016). *Husserl's Missing Technologies*. New York: Fordham University Press.
- Ihde, D. (2022). *Material Hermeneutics: Reversing the Linguistic Turn*. London and New York: Routledge.
- Jayanti, A. (2019). Instrumental Realisms and Their Ontological Commitments: A Critical Evaluation. *Techné: Research in Philosophy and Technology*, 23 (1), 68-82 (<https://doi.org/10.5840/techne201951396>).
- Kenderdine, S. (2015). Embodiment, Entanglement, and Immersion in Digital Cultural Heritage. In S. Schreibman et al. (eds), *A New Companion to Digital Humanities* (22-41). New York: John Wiley and Sons.
- Langsdorf, L. (2016). From Interrelational Ontology to Instrumental Ethics: Expanding Pragmatic Postphenomenology. *Techné: Research in Philosophy and Technology*, 20 (2), 112-128 (<https://doi.org/10.5840/techne20168857>).
- Merleau-Ponty, M. (2001). *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*. Engl. Trans. L. Lawlor & B. Bergo. Evanston: Northwestern University Press.
- Merleau-Ponty, M. (2002). *Phenomenology of Perception*. Engl. Trans. C. Smith. London and New York: Routledge.
- Merleau-Ponty, M. (2010). *Institution and Passivity: Course Notes from the Collège de France (1954-1955)*. Engl. Trans. L. Lawlor & H. Massey. Evanston: Northwestern University Press.
- Morton, T. (2013). *Hyperobjects: Philosophy and Ecology after the End of the World*. London and Minneapolis: University of Minnesota Press.
- Morton, T. (2018). *Being Ecological*. Cambridge: The MIT Press.
- Nativi, S. et al. (2021). Digital Ecosystems for Developing Digital Twins of the Earth: The Destination Earth Case. *Remote Sensing*, 13 (11), 1-25 (<https://doi.org/10.3390/rs13112119>).
- Polanyi, M. (1962). *Personal Knowledge. Towards a Post-Critical Philosophy*. London: Routledge.
- Pradelle, D. (2008). La constitution des idéalités est-elle une création?. *Les études philosophiques*, 85 (2), 227-251 (<https://doi.org/10.3917/leph.082.0227>).
- Pradelle, D. (2013). *Généalogie de la raison*. Paris: Presses Universitaires de France.
- Rhéaume, M. (2016). Husserl, la signification et la morsure du temps. *Philosophie*, 131 (4), 36-51 (<https://doi.org/10.3917/philo.131.0036>).
- Rosenberger, R. (2023) (ed.). *The Critical Ihde*. Albany: SUNY.
- Sartenaer, O. (2014). Synchronic vs. Diachronic Emergence: A Reappraisal. *European Journal for Philosophy of Science*, 5, 31-54 (<https://doi.org/10.1007/s13194-014-0097-2>).

- Serres, M. (1995). *The Natural Contract*. Engl. Trans. E. MacArthur & W. Paulson. Ann Arbor, MI: University of Michigan Press
- Shirokanova A. (2014). New Media in Everyday Life: Reassembling the Mediated Identity. In I. Nalivaika & M. B. Tin (eds), *Phenomenology of the Everyday* (118-149). Oslo: Novus Press.
- Stiegler, B. (2009). *Technics and Time, 2. Disorientation*. Engl. Trans. S. F. Barker. Redwood City, CA: Stanford University Press.
- Toadvine, T. (2024). *The Memory of the World: Deep Time, Animality, and Eschatology*. London and Minneapolis: University of Minnesota Press
- Verbeek, P.-P. (2001). Don Ihde: The Technological Lifeworld. In H. Achterhuis (ed.), *American Philosophy of Technology. The Empirical Turn* (119-146).
- Verma, A. K. (2017). Environmental Ethics: Need to Rethink. *International Journal of Environmental Sciences*, 8 (1), 7-9.
- Wapner, P. & Matthew, R. A. (2009). The Humanity of Global Environmental Ethics. *The Journal of Environment & Development*, 18 (2), 203-222 (<https://doi.org/10.1177/1070496509334693>).
- Wiltsche, H. A. (2017). Mechanics Lost: Husserl's Galileo and Ihde's Telescope. *Husserl Studies*, 33 (2), 149-173 (<https://doi.org/10.1007/s10743-016-9204-x>).
- Zhang J. (2021). Transcendental Co-originariness of Subjectivity, Intersubjectivity, and the World: Another Reading of Husserl's Transcendental Phenomenology. *Human Studies*, 44, 121-138 (<https://doi.org/10.1007/s10746-021-09573-8>).